

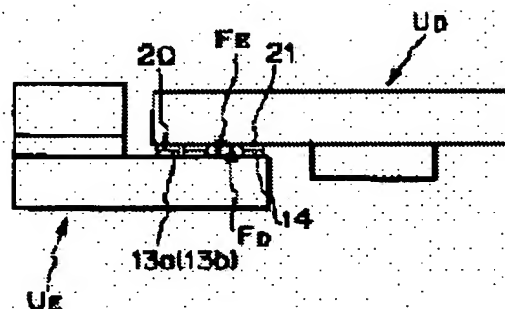
**INK-JET HEAD, INK-JET CARTRIDGE, AND INK-JET APPARATUS**

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**Inventor:** SUEOKA MANABU; HIROZAWA TOSHIAKI; YAMANE TORU  
**Applicant:** CANON KK  
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**Abstract of JP9141874**

**PROBLEM TO BE SOLVED:** To surely and stably perform electric connection between an energy generation element unit in a separable state and a driving element unit. **SOLUTION:** In an ink-jet head which is equipped with an energy generation element unit UE which has signal wiring for supplying an electric signal to an exothermic resistor and in which connection electrodes 13a, 13b are installed projectingly in the terminal part of the signal wiring positioned on a butting surface F, and a driving element unit UD which has signal wiring for sending an electric signal for driving the exothermic resistor from a driving element and in which a connection electrode 20 is installed projectingly in the terminal part of the signal wiring positioned on a butting surface and in which the butting surfaces FE, FD of the two units UE, UD are laid to overlap each other to connect the connection electrodes 13a, 13b, 20 each other, a projection part 14 for maintaining these opposite distances is formed at least on one butting surface FE of the two units UE, UD.



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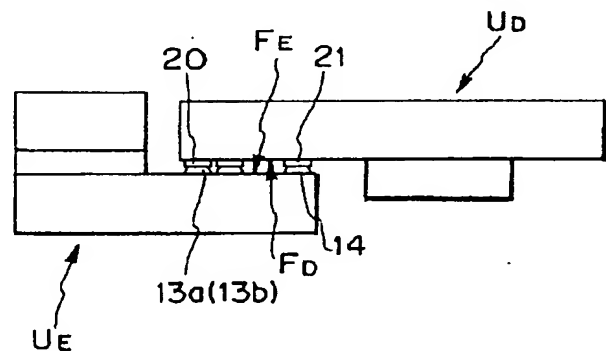
(21) 出願番号	特願平8-247555	(71) 出願人	000001007 キヤノン株式会社 東京都大田区下丸子3丁目30番2号
(22) 出願日	平成8年(1996)9月19日	(72) 発明者	末岡 学 東京都大田区下丸子3丁目30番2号 キヤ ノン株式会社内
(31) 優先権主張番号	特願平7-243396	(72) 発明者	広沢 稔明 東京都大田区下丸子3丁目30番2号 キヤ ノン株式会社内
(32) 優先日	平7(1995)9月21日	(72) 発明者	山根 徹 東京都大田区下丸子3丁目30番2号 キヤ ノン株式会社内
(33) 優先権主張国	日本 (J P)	(74) 代理人	弁理士 谷 義一 (外1名)

(54) 【発明の名称】 インクジェットヘッドおよびインクジェットカートリッジならびにインクジェット装置

## (57) 【要約】

【課題】 分離可能な形態のエネルギー発生素子ユニットと駆動素子ユニットとの電気的接続を確実かつ安定して行い得ない。

【解決手段】 発熱抵抗体に電気信号を供給するための信号配線を有し、突き合わせ面  $F_E$  に位置する信号配線の端部に接続電極 13a, 13b を突設したエネルギー発生素子ユニット  $U_E$  と、発熱抵抗体を駆動するための駆動素子からの電気信号を送出するための信号配線を有し、突き合わせ面  $F_D$  に位置する信号配線の端部に接続電極 20 を突設した駆動素子ユニット  $U_D$  とを具え、これら二つのユニット  $U_E$ ,  $U_D$  の突き合わせ面  $F_E$ ,  $F_D$  を相互に重ね合わせて接続電極 13a, 13b, 20 を相互に接続するようにしたインクジェットヘッドであって、二つのユニット  $U_E$ ,  $U_D$  の少なくとも一方の突き合わせ面  $F_E$  にこれらの対向間隔を保持するための突起部 14 を形成した。



## 【特許請求の範囲】

【請求項 1】 それぞれ液体を吐出するための複数のエネルギー発生素子に一端側が接続してこれらエネルギー発生素子に電気信号を供給するための複数本の信号配線を有すると共に突き合わせ面が形成され、この突き合わせ面に位置する前記信号配線の他端側にそれぞれ複数の接続電極を突設したエネルギー発生素子ユニットと、前記エネルギー発生素子を駆動するための駆動素子に一端側がそれぞれ接続して当該駆動素子からの電気信号を送出するための複数本の信号配線を有すると共に突き合わせ面が形成され、この突き合わせ面に位置する前記信号配線の他端側にそれぞれ複数の接続電極を突設した駆動素子ユニットとを具備、前記エネルギー発生素子ユニットおよび前記駆動素子ユニットの前記突き合わせ面を相互に重ね合わせて前記接続電極を相互に接続するようにしたインクジェットヘッドであって、前記エネルギー発生素子ユニットおよび前記駆動素子ユニットの少なくとも一方の前記突き合わせ面にこれらの対向間隔を保持するための突起部を形成したことを特徴とするインクジェットヘッド。

【請求項 2】 前記突起部は、前記接続電極と一直線状に並ぶ領域を有することを特徴とする請求項 1 に記載のインクジェットヘッド。

【請求項 3】 前記突起部は、前記信号配線の他端側の延長上に前記接続電極の配列方向に沿って並ぶ領域を有することを特徴とする請求項 1 に記載のインクジェットヘッド。

【請求項 4】 前記突起部は、前記接続電極と一直線状に並ぶ領域と、前記信号配線の他端側の延長上に前記接続電極の配列方向に沿って並ぶ領域とを有することを特徴とする請求項 1 に記載のインクジェットヘッド。

【請求項 5】 前記突起部は、前記接続電極と対応した形状のダミー電極であることを特徴とする請求項 1 から請求項 4 の何れかに記載のインクジェットヘッド。

【請求項 6】 前記エネルギー発生素子は、前記液体に膜沸騰を生じさせる熱エネルギーを発生する電気熱変換体であることを特徴とする請求項 1 から請求項 5 の何れかに記載のインクジェットヘッド。

【請求項 7】 それぞれ液体を吐出するための複数のエネルギー発生素子に一端側が接続してこれらエネルギー発生素子に電気信号を供給するための複数本の信号配線を有すると共に突き合わせ面が形成され、この突き合わせ面に位置する前記信号配線の他端側にそれぞれ複数の接続電極を突設したエネルギー発生素子ユニットと、前記エネルギー発生素子を駆動するための駆動素子に一端側がそれぞれ接続して当該駆動素子からの電気信号を送出するための複数本の信号配線を有すると共に突き合わせ面が形成され、この突き合わせ面に位置する前記信号配線の他端側にそれぞれ複数の接続電極を突設した駆動素子ユニットとを具備、前記エネルギー発生素子ユニッ

トおよび前記駆動素子ユニットの前記突き合わせ面を相互に重ね合わせて前記接続電極を相互に接続するようにしたインクジェットヘッドと、

このインクジェットヘッドに供給するための前記液体を蓄える液体タンクとを具備したインクジェットカートリッジであって、

前記エネルギー発生素子ユニットおよび前記駆動素子ユニットの少なくとも一方の前記突き合わせ面にこれらの対向間隔を保持するための突起部を形成したことを特徴とするインクジェットカートリッジ。

【請求項 8】 前記液体は、インクおよび／またはプリント媒体に吐出されるこのインクの特性を調整する処理液であることを特徴とする請求項 7 に記載のインクジェットカートリッジ。

【請求項 9】 複数の吐出口からそれぞれ液体を吐出するための複数のエネルギー発生素子に一端側が接続してこれらエネルギー発生素子に電気信号を供給するための複数本の信号配線を有すると共に突き合わせ面が形成され、この突き合わせ面に位置する前記信号配線の他端側にそれぞれ複数の接続電極を突設した駆動素子ユニットと、前記エネルギー発生素子ユニットと、前記エネルギー発生素子を駆動するための駆動素子に一端側がそれぞれ接続して当該駆動素子からの電気信号を送出するための複数本の信号配線を有すると共に突き合わせ面が形成され、この突き合わせ面に位置する前記信号配線の他端側にそれぞれ複数の接続電極を突設した駆動素子ユニットとを具備、前記エネルギー発生素子ユニットおよび前記駆動素子ユニットの前記突き合わせ面を相互に重ね合わせて前記接続電極を相互に接続するようにしたインクジェットヘッドを用いるインクジェット装置であって、前記エネルギー発生素子ユニットおよび前記駆動素子ユニットの少なくとも一方の前記突き合わせ面にこれらの対向間隔を保持するための突起部を形成したことを特徴とするインクジェット装置。

【請求項 10】 前記突起部は、前記接続電極と一直線状に並ぶ領域を有することを特徴とする請求項 9 に記載したインクジェット装置。

【請求項 11】 前記突起部は、前記信号配線の他端側の延長上に前記接続電極の配列方向に沿って並ぶ領域を有することを特徴とする請求項 9 に記載したインクジェット装置。

【請求項 12】 前記突起部は、前記接続電極と一直線状に並ぶ領域と、前記信号配線の他端側の延長上に前記接続電極の配列方向に沿って並ぶ領域とを有することを特徴とする請求項 9 に記載したインクジェット装置。

【請求項 13】 前記突起部は、前記接続電極と対応した形状のダミー電極であることを特徴とする請求項 9 から請求項 12 の何れかに記載したインクジェット装置。

【請求項 14】 前記吐出口は、プリント媒体のプリント領域の全幅に互って配列していることを特徴とする請

求項9から請求項13の何れかに記載のインクジェット装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、液体を吐出してプリント媒体にプリントを行うためのエネルギー発生素子を有するエネルギー発生素子ユニットと、このエネルギー発生素子を駆動させるための駆動素子を有する駆動素子ユニットとを具えたインクジェットヘッドおよびこのインクジェットヘッドを組み込んだインクジェットカートリッジならびにインクジェットヘッドを用いるインクジェット装置に関する。

【0002】

【従来の技術】インクジェットプリント法は、インクジェットヘッドに配設された吐出口からインクやこのインクの特性を調整するための処理液を吐出させ、これを紙などのプリント媒体に付着させることにより、プリントを行う方法であり、騒音の発生が極めて少なく、かつ高速プリントが可能である。なかでも、熱エネルギーを液体に作用させ、液体を急激に加熱することによって気泡を発生させ、この気泡の体積膨張によって液流路内の液体を吐出口から液滴として噴射し、気泡の消滅時に液室から液流路内に液体を導入するようにした形態のインクジェットヘッドは、プリント信号に対する応答性が良いこと、および高マルチヘッド化が容易であることなどの利点を有する。

【0003】このようなインクジェットヘッドのエネルギー発生ユニットの外観を図11に示し、その一部を破断した状態を図12に示す。すなわち、基板101の表面に形成された絶縁層の上にエネルギー発生素子である電気熱変換素子としての発熱抵抗体102が設けられており、さらにこの発熱抵抗体102に通電するための図示しない電極が配設されている。この基板101上の発熱抵抗体102が臨む液流路103は、その一方が開口して吐出口104となり、他方が共通液室105に連通している。この共通液室105には、インクジェットヘッドに対して別に付設される図示しない液体タンクが結合部材106を介して連結される。

【0004】図示するように、一直線状に配列する吐出口104にそれぞれ連通する液流路103毎に発熱抵抗体102を組み込み、プリント媒体に対して複数ドットのプリントを同時に行う場合、発熱抵抗体102に対して個別に通電のオン/オフを制御する必要がある。このような制御を行うための駆動素子は、上述したエネルギー発生素子ユニット107に一体的に組み込むか、あるいは図13およびそのXIV-XIV矢視断面構造を表す図14に示すように、ボンディングワイヤ108を介してエネルギー発生素子ユニット107と電気的に接続するなどの方法がある。

【0005】しかし、エネルギー発生素子ユニット10

7と、駆動素子109とをボンディングワイヤ108によって固定状態で接続した場合、発熱抵抗体102および駆動素子109の何れか少なくとも一方に不良が発生すると、インクジェットヘッド全体が動作しなくなってしまうという問題がある。

【0006】このような問題を解決するため、図15に示すような駆動素子109を有する駆動素子ユニット110を用い、この駆動素子ユニット110とエネルギー発生素子ユニット107とを分離可能とし、図16に示すようにこれらの接続電極111、112を相互に重ね合わせて密着させ、電気的に接続を行うタイプのインクジェットヘッドおよびこのインクジェットヘッドを用いたインクジェット装置が提案されている。

【0007】上述した交換式のエネルギー発生素子ユニット107を用いた場合、エネルギー発生素子ユニット107に故障が生じたり、その寿命によってプリント作業が不能となった場合、エネルギー発生素子ユニット107のみを新たなものと交換し、駆動素子ユニット110に接続するだけで良いため、コスト的に大変有利である。

【0008】

【発明が解決しようとする課題】図16に示すように、エネルギー発生素子ユニット107と駆動素子ユニット110とを分離可能に重ね合わせて密着させるようにしたインクジェットヘッドにおいて、これらの接続電極111、112は、実際にインクを吐出する発熱抵抗体102と対応した数だけそれぞれ設置されており、インクジェットヘッドとしての機能や性能を完全に発揮するためには、これら接続電極111、112の全てが確実に接続されている必要がある。

【0009】しかしながら、従来のものでは、各ユニット107、110の突き合わせ面113、114から突出する接続電極111、112の高さや形状の不均一、あるいは、密着操作時の押圧力の不均一に起因して接続不良が起こり得る他、図17に示すようにユニット107、110の接合時に押圧力の作用点が接続電極111、112の間からずれると、ユニット107、110の間に接続電極111、112を中心とするモーメント力が発生する結果、接続電極111、112の間に接続不良が発生する虞があった。

【0010】

【発明の目的】本発明の目的は、分離可能な形態のエネルギー発生素子ユニットと駆動素子ユニットとの電気的接続を確実かつ安定して行い得るようにしたインクジェットヘッドおよびこのインクジェットヘッドを組み込んだインクジェットカートリッジならびにインクジェットヘッドを用いるインクジェット装置を提供することにある。

【0011】

【課題を解決するための手段】本発明による第1の形態

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は、それぞれ液体を吐出するための複数のエネルギー発生素子に一端側が接続してこれらエネルギー発生素子に電気信号を供給するための複数本の信号配線を有すると共に突き合わせ面が形成され、この突き合わせ面に位置する前記信号配線の他端側にそれぞれ複数の接続電極を突設したエネルギー発生素子ユニットと、前記エネルギー発生素子を駆動するための駆動素子に一端側がそれぞれ接続して当該駆動素子からの電気信号を送出するための複数本の信号配線を有すると共に突き合わせ面が形成され、この突き合わせ面に位置する前記信号配線の他端側にそれぞれ複数の接続電極を突設した駆動素子ユニットとを具え、前記エネルギー発生素子ユニットおよび前記駆動素子ユニットの前記突き合わせ面を相互に重ね合わせて前記接続電極を相互に接続するようにしたインクジェットヘッドであって、前記エネルギー発生素子ユニットおよび前記駆動素子ユニットの少なくとも一方の前記突き合わせ面にこれらの対向間隔を保持するための突起部を形成したことを特徴とするインクジェットヘッドにある。

【0012】また、本発明による第二の形態は、それぞれ液体を吐出するための複数のエネルギー発生素子に一端側が接続してこれらエネルギー発生素子に電気信号を供給するための複数本の信号配線を有すると共に突き合わせ面が形成され、この突き合わせ面に位置する前記信号配線の他端側にそれぞれ複数の接続電極を突設したエネルギー発生素子ユニットと、前記エネルギー発生素子を駆動するための駆動素子に一端側がそれぞれ接続して当該駆動素子からの電気信号を送出するための複数本の信号配線を有すると共に突き合わせ面が形成され、この突き合わせ面に位置する前記信号配線の他端側にそれぞれ複数の接続電極を突設した駆動素子ユニットとを具え、前記エネルギー発生素子ユニットおよび前記駆動素子ユニットの前記突き合わせ面を相互に重ね合わせて前記接続電極を相互に接続するようにしたインクジェットヘッドと、このインクジェットヘッドに供給するための前記液体を蓄える液体タンクとを具えたインクジェットカートリッジであって、前記エネルギー発生素子ユニットおよび前記駆動素子ユニットの少なくとも一方の前記突き合わせ面にこれらの対向間隔を保持するための突起部を形成したことを特徴とするインクジェットカートリッジにある。

【0013】さらに、本発明の第3の形態は、複数の吐出口からそれぞれ液体を吐出するための複数のエネルギー発生素子に一端側が接続してこれらエネルギー発生素子に電気信号を供給するための複数本の信号配線を有すると共に突き合わせ面が形成され、この突き合わせ面に位置する前記信号配線の他端側にそれぞれ複数の接続電極を突設したエネルギー発生素子ユニットと、前記エネルギー発生素子を駆動するための駆動素子に一端側がそれぞれ接続して当該駆動素子からの電気信号を送出する

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ための複数本の信号配線を有すると共に突き合わせ面が形成され、この突き合わせ面に位置する前記信号配線の他端側にそれぞれ複数の接続電極を突設した駆動素子ユニットとを具え、前記エネルギー発生素子ユニットおよび前記駆動素子ユニットの前記突き合わせ面を相互に重ね合わせて前記接続電極を相互に接続するようにしたインクジェットヘッドを用いるインクジェット装置であって、前記エネルギー発生素子ユニットおよび前記駆動素子ユニットの少なくとも一方の前記突き合わせ面にこれらの対向間隔を保持するための突起部を形成したことを特徴とするインクジェット装置にある。

【0014】本発明によると、エネルギー発生素子ユニットおよび駆動素子ユニットの突き合わせ面を相互に重ね合わせて接続電極を相互に電気的に接続した場合、エネルギー発生素子ユニットおよび駆動素子ユニットの少なくとも一方の突き合わせ面には、これらの対向間隔を保持するための突起部を形成されており、これらの突き合わせ面は正対状態となって全ての接続電極が正しく接触する。

【0015】駆動素子ユニットの駆動素子からその信号配線を介して送出される電気信号は、接続電極を介してエネルギー発生素子ユニットの信号配線からエネルギー発生素子に供給され、これによりエネルギー発生素子が起動して液体が吐出される。

【0016】

【発明の実施の形態】本発明の第1の形態によるインクジェットヘッドにおいて、前記突起部は、接続電極と一直線状に並ぶ領域を有するものであってもよいし、信号配線の他端側の延長上に接続電極の配列方向に沿って並ぶ領域を有するものであってもよいし、あるいは接続電極と一直線状に並ぶ領域と、信号配線の他端側の延長上に接続電極の配列方向に沿って並ぶ領域とを有するものであってもよい。また、突起部は、接続電極と対応した形状のダミー電極であってもよく、エネルギー発生素子は、液体に膜沸騰を生じさせる熱エネルギーを発生する電気熱変換体であってもよい。

【0017】本発明の第2の形態によるインクジェットカートリッジにおいて、前記液体は、インクか、プリント媒体に吐出されるインクの特性を調整する処理液か、あるいはこれらインクおよび処理液であることが望ましい。

【0018】ここで、前記突起部は、接続電極と一直線状に並ぶ領域を有するものであってもよいし、信号配線の他端側の延長上に接続電極の配列方向に沿って並ぶ領域を有するものであってもよいし、あるいは接続電極と一直線状に並ぶ領域と、信号配線の他端側の延長上に接続電極の配列方向に沿って並ぶ領域とを有するものであってもよい。また、突起部は、接続電極と対応した形状のダミー電極であってもよく、吐出口は、プリント媒体のプリント領域の全幅に亘って配列しているものであ

てもよい。

【0019】

【実施例】本発明によるインクジェットヘッドの実施例の幾つかについて、図1～図8を参照しながら詳細に説明するが、このインクジェットヘッドを構成するエネルギー発生素子ユニットおよび駆動素子ユニットにそれぞれ設けられる接続電極の部分の基本的な構造は、これら二つのユニット共に全く同一形態にすることが可能である。

【0020】従って、以下には一方のユニットであるエネルギー発生素子ユニットについてのみ説明するが、駆動素子ユニットの接続電極部の構造も全く同じ構造を採用することができる。

【0021】第1の実施例におけるエネルギー発生素子ユニットの基板表面の外観を表す図1およびそのII-II矢視断面構造を表す図2に示すように、矩形をなす基板11の表面には、二酸化ケイ素(SiO<sub>2</sub>)などの蓄熱性を有する絶縁層12が形成されており、この絶縁層12上には、その長手方向に沿って複数対の接続電極13a、13bと、ダミー電極14とが所定間隔で一直線状に配列している。そして、これら接続電極13a、13bおよびダミー電極14の周囲の基板11の表面が本発明の突き合わせ面Feとして機能するようになっている。

【0022】各対の接続電極13a、13bは、基板11の前後方向(図2中、左右方向)に延びるアルミニウムなどによる信号配線15の一端部に形成され、これら各対の信号配線15の他端部は、エネルギー発生素子としてのニホウ化ハフニウム(HfB<sub>2</sub>)などによる発熱抵抗体16を介して相互に連結され、全体としてそれぞれU字状の形態をなしている。これら接続電極13a、13bは、抵抗層16'および信号配線15の上に積層された状態となっており、これら接続電極13a、13bを除いて抵抗層16'および信号配線15は、二酸化ケイ素などによる耐酸化性の絶縁層17で被覆され、さらにタンタルなどによる耐キャビテーション層18が絶縁層17を介して発熱抵抗体16の上に積層されている。

【0023】本発明の突起部としてのダミー電極14は、接続電極13a、13bよりもさらに基板11の前後方向一端側に接続電極13a、13bの配列方向に沿ってこれらと平行に配列し、上述した接続電極13a、13bと同様に、抵抗層16'および導電層15'の上に積層された状態となっている。そして、これら抵抗層16'および導電層15'は、ダミー電極14を除いて絶縁層17で被覆された状態となっている。

【0024】このような構造の基板11の製造手順について説明すると、まず、基板11の表面に、絶縁層12と抵抗層16'と導電層15'とをそれぞれスパッタリングにて順に2μm、0.2μm、0.6μmの膜厚で積層形成する(図3参照)。

【0025】そして、フォトリソグラフィの技術を用いて

抵抗層16'および導電層15'のエッチングにより、発熱抵抗体16および信号配線15と、ダミー電極14のための抵抗層16'および導電層15'をパターン形成する(図4参照)。

【0026】しかる後、これらの表面に絶縁膜と、耐キャビテーション膜とをそれぞれスパッタリングにて順に0.9μm、0.5μmの膜厚で積層形成し、フォトリソグラフィの技術を用いて絶縁膜および耐キャビテーション膜のエッチングにより絶縁層17と、耐キャビテーション層18とをパターン形成する。この時、信号配線15の表面およびダミー電極14に対応する導電層15'の表面にそれぞれ臨むスルーホール19が形成されるように、絶縁層17の一部をエッチング処理する(図5参照)。

【0027】さらに、電気めっき下引き層として、チタンおよび銅をそれぞれ0.05μm、0.3μmの順に成膜する。次いで、めっき形成用のレジストを用いてパターン形成を行った後、電気めっき法によって金、ニッケル、銅、白金などを数マイクロメートルから数十マイクロメートルの膜厚で形成する。そして、レジストを剥離すると共に下引き層のエッチングを行い、スルーホール19の部分に接続電極13a、13bおよびダミー電極14を図2に示すように形成する。

【0028】このようにして得た基板11に対し、図12に示したような吐出口104やインク流路103および共通インク室105などを形成し、さらに図11に示す如き結合部材106を接合してエネルギー発生素子ユニットを作成した。

【0029】このエネルギー発生素子ユニットと駆動素子ユニットとの組み付けによるインクジェットヘッドの外観を表す図6に示すように、接続電極13a、13bおよびダミー電極14が突出するエネルギー発生素子ユニットUeの突き合わせ面Feと、接続電極20およびダミー電極21が突出する駆動素子ユニットUdの突き合わせ面Fdとを重ね合わせ、これらの接続電極13a、13b、20を相互に接続した場合、これらの接合力の作用点が接続電極13a、13b、20とダミー電極14、21との間にあれば、突合せ面Fe、Fdが相互に平行に保たれ、接続電極13a、13b、20を良好な接続状態に保持することができる。この場合、基板11の表面からの接続電極13a、13bおよびダミー電極14の突出高さを等しくすることが好ましく、このような条件を満たすことができるならば、ダミー電極14に代えて別な突出部を形成するようにしても良い。

【0030】このように、ダミー電極14、21を形成することによって、エネルギー発生素子ユニットUeと駆動素子ユニットUdとを接合する際の作用点の位置ずれの許容範囲が図16および図17に示す従来のものよりも広げることができ、これらエネルギー発生素子ユニットUeおよび駆動素子ユニットUdの位置決め機構な

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どをより簡略化して低コスト化を達成することができる。

【0031】上述した実施例では、ダミー電極 14 を接続電極 13 a、13 b よりもさらに基板 11 の前後方向一端側で接続電極 13 a、13 b の配列方向に沿って形成したが、本発明の第二の実施例における基板表面の外観を表す図 7 に示すように、基板 11 の長手方向両端部、つまり接続電極 13 a、13 b の配列方向に沿ったその両端側にこれらと一直線状に並ぶように、ダミー電極 14 a、14 b を形成するようにしても良い。さらに、本発明の第三の実施例における基板表面の外観を表す図 8 に示すように、これら二つの実施例を組み合わせ、接続電極 13 a、13 b よりもさらに基板 11 の前後方向一端側で接続電極 13 a、13 b の配列方向に沿ってダミー電極 14 を形成すると共に、接続電極 13 a、13 b の配列方向に沿った基板 11 の長手方向両端部に、これら接続電極 13 a、13 b と一直線状に並ぶようにダミー電極 14 a、14 b を形成するようにしても良い。

【0032】なお、これら図 7 および図 8 において、図 1 に示した先の実施例と同一機能の部材には、これと同一符号を記してある。

【0033】次に、上述したようなインクジェットヘッドを組み込んだ本発明によるインクジェットカートリッジの一実施例について、その外観を表す図 9 を参照しながら詳細に説明する。

【0034】すなわち、本実施例におけるインクジェットカートリッジ 31 は、図示しないシリアルタイプのインクジェット装置のキャリッジに位置決め状態で取り付けられ、インクジェット装置との間で電気的な信号などの授受を行うようになっている。キャリッジに対して着脱可能に交換されるインクジェットカートリッジ 31 は、インクジェットヘッド 10 と、このインクジェットヘッド 10 を保持するヘッドホルダ 32 と、このヘッドホルダ 32 にインクジェットヘッド 10 を押圧する押圧ブロック 33 と、インクを収容するインクタンク 34 と、このインクタンク 34 内を密閉する蓋部材 35 とで主要部が構成されており、インクジェットカートリッジ 31 の容積の大部分を占めるインクタンク 34 には、このインクタンク 34 内を大気圧に保持するための大気連

通口 36 が形成されている。

【0035】インクを吐出するための多数のインク吐出口 104 が形成されたインクジェットヘッド 10 は、先の図 1～図 8 に示した実施例と対応した構造を有するものであり、このインクジェットヘッド 10 は、押圧ブロック 33 によってヘッドホルダ 32 に押圧保持されている。インクは、インクタンク 34 からインクジェットヘッド 10 の図示しないインク供給管および連通路を介して共通インク室 105 および各インク流路 103 に導かれる（それぞれ図 12 参照）。

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【0036】本実施例におけるインクジェットカートリッジ 31 は、インクジェットヘッド 10 とインクタンク 34 とを一体的に形成したものであるが、このインクジェットヘッド 10 に対し、インクタンク 34 側を交換可能に連結した構造のインクジェットカートリッジであっても良い。

【0037】さらに、本発明のインクジェットヘッドを搭載した本発明によるインクジェット装置の一実施例の外観を図 10 に示す。すなわち、本実施例のインクジェット装置は、フルラインタイプのカラープリンタであり、インクジェットカートリッジは、イエロー色インク、マゼンタ色インク、シアン色インク、ブラック色インクをそれぞれ蓄えた 4 つのインクタンク 37 Y、37 M、37 C、37 B（以下、これらをまとめてインクタンク 37 と記述する）と、これらインクタンク 37 にそれぞれ接続配管 38 を介してインク供給管が接続する 4 つのインクジェットヘッド 10 Y、10 M、10 C、10 B（以下、これらをまとめてインクジェットヘッド 10 と記述する）とを具え、各インクタンク 37 は、接続配管 38 に対して交換可能に連結される。

【0038】制御装置 39 に接続するヘッドドライバ 40 によって各発熱抵抗体 16 に対する通電のオン／オフがそれぞれ切り換えられるインクジェットヘッド 10 は、図 1～8 に示した実施例のものと基本的な構造は全く同じであり、無端の搬送用ベルト 41 を挟んでプラテン 42 と対向するように、搬送用ベルト 41 の搬送方向に沿って所定間隔で配列している。そして、制御装置 39 によって作動が制御される回復処理のためのヘッド移動手段 43 により、プラテン 42 との対向方向に昇降し得るようになっている。各インクジェットヘッド 10 の側方には、プリント用紙 44 に対するプリント作業に先立ち、インク流路 103 内に介在する古いインクをインク吐出口 24 から吐出してインクジェットヘッド 10 の回復処理を行うためのヘッドキャップ 45 がインクジェットヘッド 10 の配列間隔に対して半ピッチずらした状態で配置され、制御装置 39 によって作動が制御されるキャップ移動手段 46 により、それぞれインクジェットヘッド 10 の直下に移動し、インク吐出口 24 から吐出される廃インクを受けるようになっている。

【0039】プリント用紙 44 を搬送する搬送用ベルト 41 は、ベルト駆動モータ 47 に連結された駆動ローラ 48 に巻き掛けられ、制御装置 39 に接続するモータドライバ 49 によってその作動が切り換えられる。また、搬送用ベルト 41 の上流側には、この搬送用ベルト 41 を帯電することにより、プリント用紙 44 を搬送用ベルト 41 に密着させるための帯電器 50 が設けられており、この帯電器 50 は、制御装置 39 に接続する帯電器ドライバ 51 によって、その通電のオン／オフが切り換えられる。搬送用ベルト 41 の上にプリント用紙 44 を供給するための一対の給紙ローラ 52 には、これら一対



の給紙ローラ 52 を駆動回転させるための給紙用モータ 53 が連結され、この給紙用モータ 53 は、制御装置 39 に接続するモータドライバ 54 によって作動が切り換えられる。

【0040】従って、プリント用紙 44 に対するプリント作業に先立ち、インクジェットヘッド 10 がプラテン 42 から離れるように上昇し、次いでヘッドキャップ 45 がこれらインクジェットヘッド 10 の直下に移動してインクジェットヘッド 10 の回復処理を行った後、ヘッドキャップ 45 を元の待機位置へ移動させ、さらにインクジェットヘッド 10 をプリント位置までプラテン 42 側に移動する。そして、帯電器 50 を作動させると同時に搬送用ベルト 41 を駆動し、さらに給紙ローラ 52 によってプリント用紙 44 を搬送用ベルト 41 上に載置し、各インクジェットヘッド 10 によって所定の色画像がプリント用紙 44 にプリントされる。

【0041】上述した各実施例では、プリントの高密度化、高精細化を達成するため、エネルギー発生素子として熱エネルギーを発生する電気熱変換素子を用いたインクジェットヘッドについて説明したが、圧電素子などの電気機械変換素子を用いたインクジェットヘッドにも応用することができる。

【0042】上述の電気熱変換素子やレーザ光を用いたインクジェットヘッドの代表的な構成や原理については、例えば、米国特許第 4,723,129 号明細書や、同第 4,740,796 号明細書に開示されている基本的な原理を用いて行うものが好ましい。この方式はいわゆるオンデマンド型およびコンティニュアス型の何れにも適用可能であるが、特に、オンデマンド型の場合には、液体が保持されているシートや液流路に対応して配置されている電気熱変換素子に、プリント情報に対応して核沸騰を越える急速な温度上昇を与える少なくとも 1 つの駆動信号を印加することによって、電気熱変換素子に熱エネルギーを発生させ、インクジェットヘッドの熱作用面に膜沸騰を生じさせて、結果的にこの駆動信号に一对一で対応した液体内の気泡を形成できるので有効である。この気泡の成長および収縮により吐出用開口を介して液体を吐出させ、少なくとも 1 つの滴を形成する。この駆動信号をパルス形状とすると、即時適切に気泡の成長収縮が行われるので、特に応答性に優れた液体の吐出が達成でき、より好ましい。このパルス形状の駆動信号としては、米国特許第 4,463,359 号明細書や、同第 4,345,262 号明細書に記載されているようなものが適している。なお、上記熱作用面の温度上昇率に関する発明の米国特許第 4,313,124 号明細書に記載されている条件を採用すると、さらに優れたプリントを行うことができる。

【0043】インクジェットヘッドの構成としては、上述の各明細書に開示されているような吐出口と液流路と電気熱変換素子との組合せ構成（直線状液流路または直

角液流路）の他に、熱作用部が屈曲する領域に配置されている構成を開示する米国特許第 4,558,333 号明細書や、米国特許第 4,459,600 号明細書を用いた構成も本発明に含まれるものである。加えて、複数の電気熱変換素子に対し、共通するスリットを電気熱変換素子の吐出部とする構成を開示する特開昭 59-123670 号公報や、熱エネルギーの圧力波を吸収する開孔を吐出部に対応させる構成を開示した特開昭 59-138461 号公報に基いた構成としても、本発明の効果は有効である。すなわち、インクジェットヘッドの形態がどのようなものであっても、本発明によればプリントを確実に効率良く行うことができるようになるからである。

【0044】さらに、インクジェット装置がプリントできるプリント媒体の最大幅に対応した長さを有するフルライントタイプのインクジェットヘッドに対しても本発明は有効に適用できる。そのようなインクジェットヘッドとしては、複数のインクジェットヘッドの組合せによってその長さを満たす構成や、一体的に形成された 1 個のインクジェットヘッドとしての構成の何れでも良い。

【0045】加えて、上例のようなシリアルタイプのもので、装置本体に固定されたインクジェットヘッド、あるいは装置本体に装着されることで装置本体との電気的な接続や装置本体からの液体の供給が可能になる交換自在のチップタイプのインクジェットヘッド、あるいはインクジェットヘッド自体に一体的に液体タンクが設けられたカートリッジタイプのインクジェットヘッドを用いた場合にも本発明は有効である。

【0046】また、本発明のインクジェット装置の構成として、インクジェットヘッドの吐出回復手段や、予備的な補助手段などを付加することは本発明の効果を一層安定できるので、好ましいものである。これらを具体的に挙げれば、インクジェットヘッドに対してのキャッピング手段や、クリーニング手段、加圧あるいは吸引手段、電気熱変換素子やこれとは別の加熱素子あるいはこれらの組み合わせを用いて加熱を行う予備加熱手段、プリントとは別の吐出を行なう予備吐出手段を挙げることができる。

【0047】また、搭載されるインクジェットヘッドの種類や個数についても、例えば単色のインクに対応して 1 個のみが設けられたものの他、プリント色や濃度を異にする複数のインクに対応して複数個数設けられるものであっても良い。すなわち、例えばインクジェット装置のプリントモードとしては黒色などの主流色のみのプリントモードだけではなく、インクジェットヘッドを一体的に構成するか、複数個の組み合わせによるか何れでも良いが、異なる色の複色カラーまたは混色によるフルカラーの各プリントモードの少なくとも一つを備えた装置にも本発明は極めて有効である。

【0048】さらに加えて、以上説明した本発明実施例



においては、液体を液体として説明しているが、室温やそれ以下で固化する液体であって、室温で軟化もしくは液化するものを用いても良く、あるいはインクジェット方式では液体自体を30℃以上70℃以下の範囲内で温度調整を行って液体の粘性を安定吐出範囲にあるように温度制御するものが一般的であるから、使用プリント信号付与時に液体が液状をなすものを用いても良い。加えて、熱エネルギーによる昇温を、液体の固形状態から液体状態への状態変化のエネルギーとして使用させることで積極的に防止するため、または液体の蒸発を防止するため、放置状態で固化し加熱によって液化する液体を用いても良い。何れにしても熱エネルギーのプリント信号に応じた付与によって液体が液化し、液状液体が吐出されるものや、プリント媒体に到達する時点ですでに固化し始めるものなどのような、熱エネルギーの付与によって初めて液化する性質の液体を使用する場合も本発明は適用可能である。このような場合の液体は、特開昭54-56847号公報あるいは特開昭60-71260号公報に記載されるような、多孔質シート凹部または貫通孔に液状又は固形物として保持された状態で、電気熱変換素子に対して対向するような形態としても良い。本発明においては、上述した各液体に対して最も有効なもの、上述した膜沸騰方式を実行するものである。

【0049】さらに加えて、上述したインクジェットヘッドを用いた本発明にかかるインクジェット装置の形態としては、コンピュータなどの情報処理機器の画像出力端末として用いられるものの他、リーダーなどと組合せた複写装置、さらには送受信機能を有するファクシミリ装置の形態を採るものなどであっても良い。

【0050】

【発明の効果】本発明によると、エネルギー発生素子ユニットおよび駆動素子ユニットの突き合わせ面の対向間隔を保持するための突起部を設けたので、これら二つのユニットの接続電極の密着状態が均一化され、容易かつ確実に信頼性の高い電氣的接続が可能となる。

【0051】また、エネルギー発生素子ユニットと駆動素子ユニットとを連結する際の加圧作用点の位置が、従来に比べてラフで良いため、より簡便な機構で確実な接続が可能であり、低コスト化を図ることができる。

【図面の簡単な説明】

【図1】本発明によるインクジェットヘッドのエネルギー発生素子ユニットを構成する基板の部分の第一実施例の形状を表す平面図である。

【図2】図1中のII-II矢視断面図である。

【図3】図4および図5と共に図2に示した基板の製造手順を表す断面図である。

【図4】図3および図5と共に図2に示した基板の製造手順を表す断面図である。

【図5】図3および図4と共に図2に示した基板の製造手順を表す断面図である。

【図6】本発明によるエネルギー発生素子ユニットと駆動素子ユニットとを結合した状態を表す概念図である。

【図7】本発明によるインクジェットヘッドのエネルギー発生素子ユニットを構成する基板の部分の第二実施例の形状を表す平面図である。

【図8】本発明によるインクジェットヘッドのエネルギー発生素子ユニットを構成する基板の部分の第三実施例の形状を表す平面図である。

【図9】本発明によるインクジェットカートリッジの一実施例の外観を表す斜視図である。

【図10】本発明によるインクジェット装置の一実施例の外観を表す概念図である。

【図11】本発明の対象となったインクジェットヘッドのエネルギー発生素子ユニットの外観を表す斜視図である。

【図12】図11に示したエネルギー発生素子ユニットの一部を破断した斜視図である。

【図13】従来のインクジェットヘッドの電気回路を表す平面図である。

【図14】図13中のXIV-XIV矢視断面図である。

【図15】従来の駆動素子ユニットの外観を表す斜視図である。

【図16】従来のエネルギー発生素子ユニットと駆動素子ユニットとを結合した状態を表す概念図である。

【図17】図16における接続電極の接触不良状態を表す概念図である。

【符号の説明】

10、10Y、10M、10C、10B インクジェットヘッド

- 30 11 基板
- 12 絶縁層
- 13a、13b 接続電極
- 14 ダミー電極
- 14a、14b ダミー電極
- 15 信号配線
- 15' 導電層
- 16 発熱抵抗体
- 16' 抵抗層
- 17 絶縁層
- 40 18 耐キャビテーション層
- 19 スルーホール
- 20 接続電極
- 21 ダミー電極
- 31 インクジェットカートリッジ
- 32 ヘッドホルダ
- 33 押圧ブロック
- 34 インクタンク
- 35 蓋部材
- 36 大気連通口
- 50 37Y、37M、37C、37B インクタンク

15

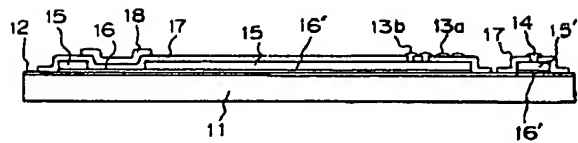
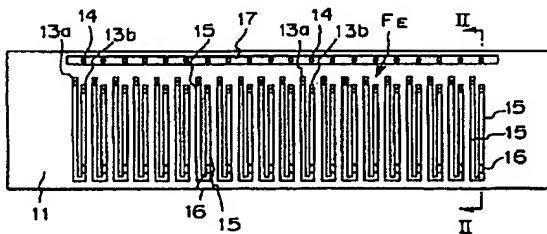
16

- 38 接続配管
- 39 制御装置
- 40 ヘッドドライバ
- 41 搬送用ベルト
- 42 プラテン
- 43 ヘッド移動手段
- 44 プリント用紙
- 45 ヘッドキャップ
- 46 キャップ移動手段
- 47 ベルト駆動モータ

- 48 駆動ローラ
- 49 モータドライバ
- 50 帯電器
- 51 帯電器ドライバ
- 52 給紙ローラ
- 53 給紙用モータ
- 54 モータドライバ
- FE, FD 突き合わせ面
- UE エネルギー発生素子ユニット
- 10 UD 駆動素子ユニット

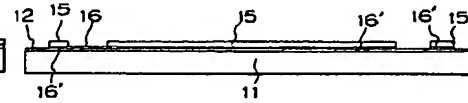
【図 1】

【図 2】



【図 3】

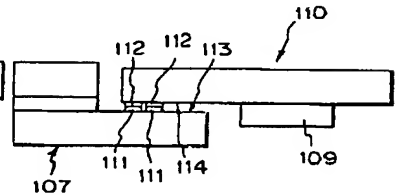
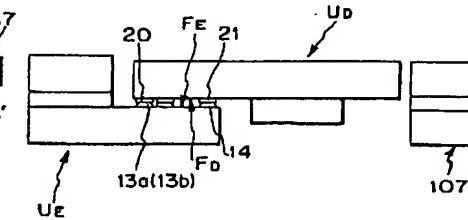
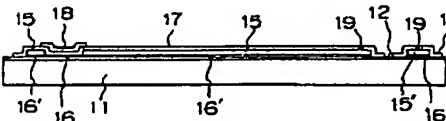
【図 4】



【図 5】

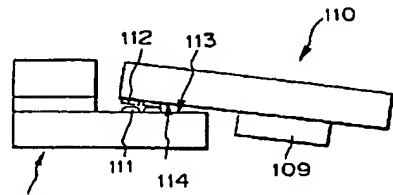
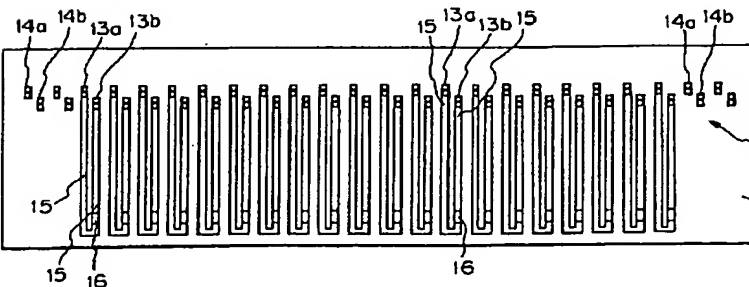
【図 6】

【図 16】

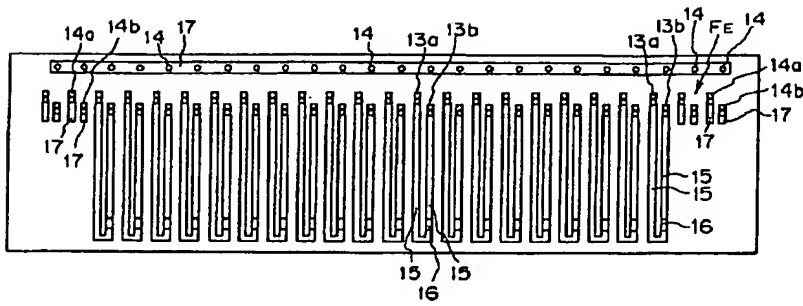


【図 7】

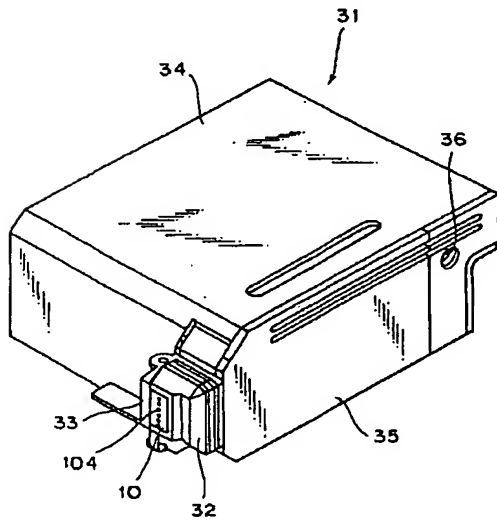
【図 17】



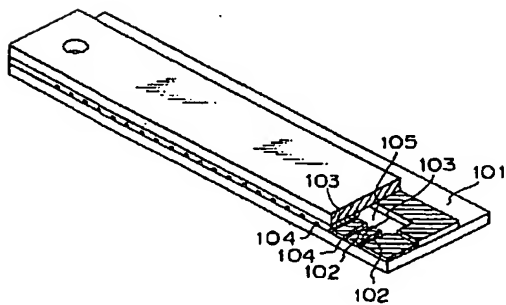
【図 8】



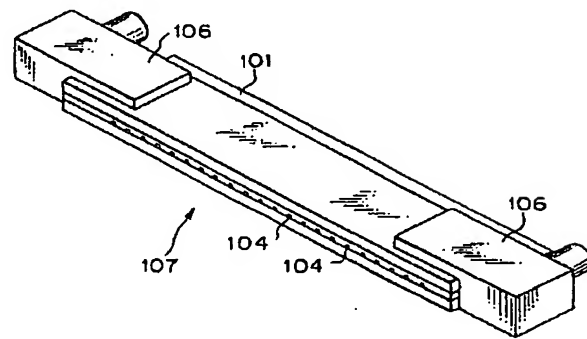
【図 9】



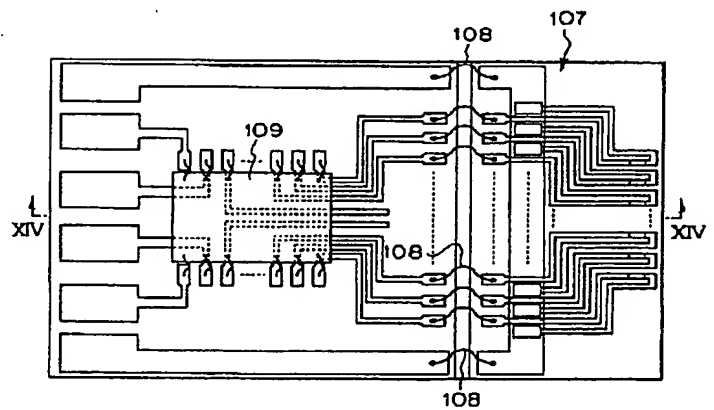
【図 12】



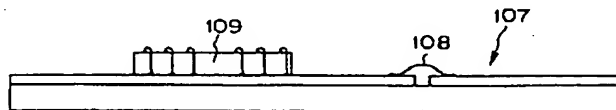
【図 11】



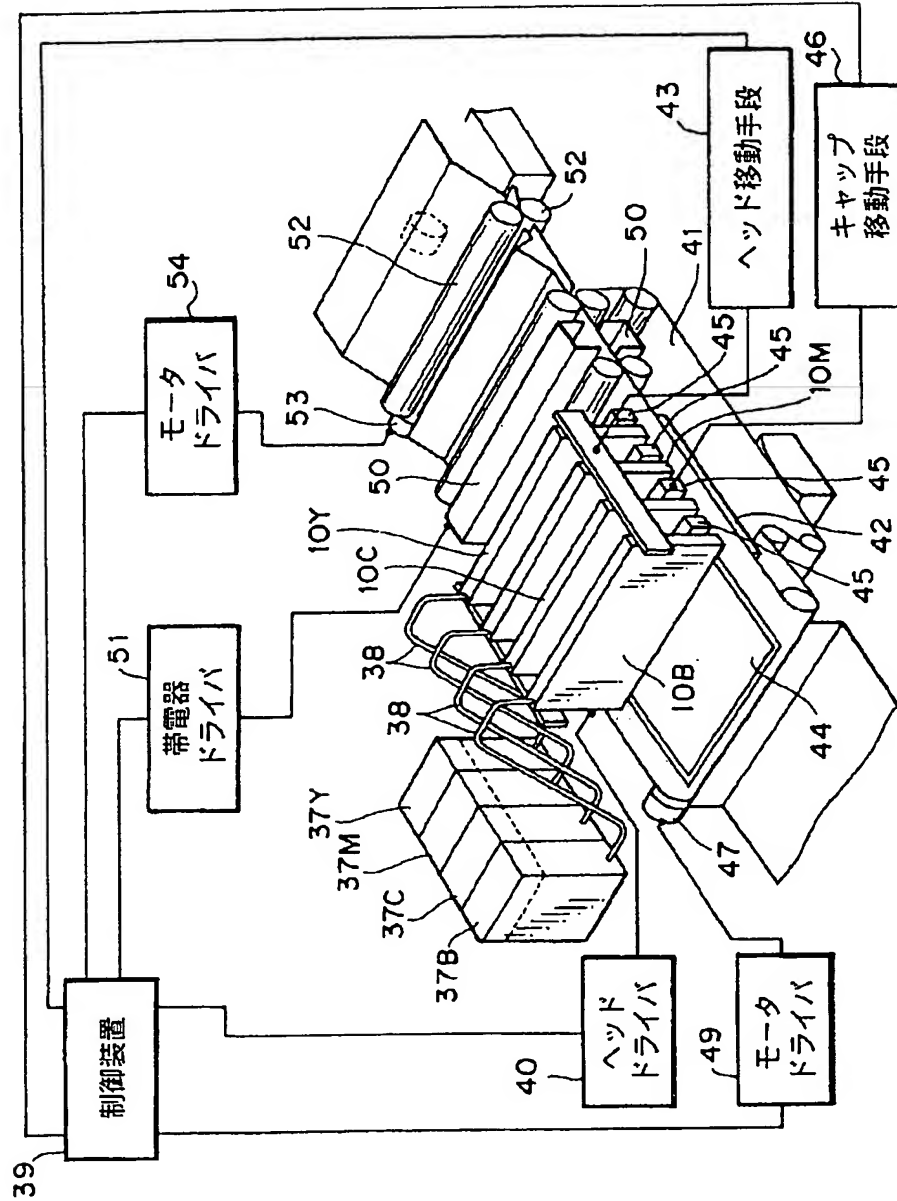
【図 13】



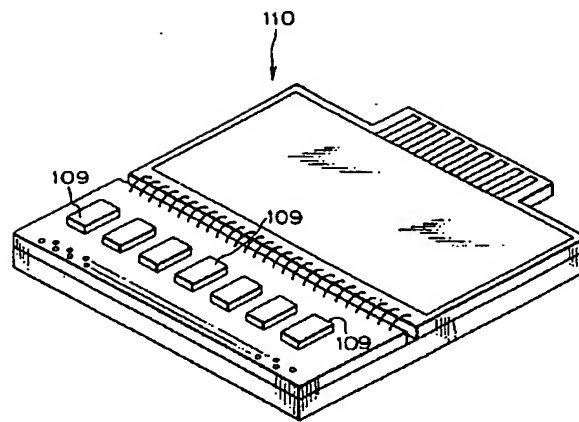
【図 14】



【图 10】



【図15】



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CLAIMS

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[Claim(s)]

[Claim 1] An abutting surface is formed while having two or more signal wiring for an end side connecting a liquid to two or more energy generation components for carrying out the regurgitation, respectively, and supplying an electrical signal to these energy generation component. The energy generation component unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively, An abutting surface is formed while having two or more signal wiring for an end side connecting with the driver element for driving said energy generation component, respectively, and sending out the electrical signal from the driver element concerned. It has the driver element unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively. It is the ink jet head which piles up said abutting surface of said energy generation component unit and said driver element unit mutually, and connected said connection electrode mutually. The ink jet head characterized by forming the height for holding these opposite spacing in said one [ at least ] abutting surface of said energy generation component unit and said driver element unit.

[Claim 2] Said height is an ink jet head according to claim 1 characterized by having the field located in a line said the shape of a connection electrode and a straight line.

[Claim 3] Said height is an ink jet head according to claim 1 characterized by having the field located in a line along the array direction of said connection electrode on the extension by the side of the other end of said signal wiring.

[Claim 4] Said height is an ink jet head according to claim 1 characterized by having the field located in a line said the shape of a connection electrode and a straight line, and the field located in a line along the array direction of said connection electrode on the extension by the side of the other end of said signal wiring.

[Claim 5] Said height is an ink jet head given in any of claim 1 to claim 4 characterized by being said connection electrode and the corresponding dummy electrode of a configuration they are.

[Claim 6] Said energy generation component is an ink jet head given in any of claim 1 to claim 5 characterized by being the electric thermal-conversion object which generates the heat energy which makes said liquid produce film boiling they are.

[Claim 7] An abutting surface is formed while having two or more signal wiring for an end side connecting a liquid to two or more energy generation components for carrying out the regurgitation, respectively, and supplying an electrical signal to these energy generation component. The energy generation component unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively, An abutting surface is formed while having two or more signal wiring for an end side connecting with the driver element for driving said energy generation component, respectively, and sending out the electrical signal from the driver element concerned. It has the driver element unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively. The ink jet head which piles up said abutting surface of said energy generation component unit and said driver element unit

mutually, and connected said connection electrode mutually, It is the ink jet cartridge equipped with the liquid tank in which said liquid for supplying this ink jet head is stored. The ink jet cartridge characterized by forming the height for holding these opposite spacing in said one [ at least ] abutting surface of said energy generation component unit and said driver element unit.

[Claim 8] Said liquid is an ink jet cartridge according to claim 7 characterized by being the processing liquid which adjusts the property of this ink breathed out by ink and/or the print medium.

[Claim 9] An abutting surface is formed while having two or more signal wiring for an end side connecting a liquid to two or more energy generation components for carrying out the regurgitation from two or more deliveries, respectively, and supplying an electrical signal to these energy generation component. The energy generation component unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively, An abutting surface is formed while having two or more signal wiring for an end side connecting with the driver element for driving said energy generation component, respectively, and sending out the electrical signal from the driver element concerned. It has the driver element unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively. It is ink jet equipment using the ink jet head which piles up said abutting surface of said energy generation component unit and said driver element unit mutually, and connected said connection electrode mutually. Ink jet equipment characterized by forming the height for holding these opposite spacing in said one [ at least ] abutting surface of said energy generation component unit and said driver element unit.

[Claim 10] Said height is ink jet equipment indicated to claim 9 characterized by having the field located in a line said the shape of a connection electrode and a straight line.

[Claim 11] Said height is ink jet equipment indicated to claim 9 characterized by having the field located in a line along the array direction of said connection electrode on the extension by the side of the other end of said signal wiring.

[Claim 12] Said height is ink jet equipment indicated to claim 9 characterized by having the field located in a line said the shape of a connection electrode and a straight line, and the field located in a line along the array direction of said connection electrode on the extension by the side of the other end of said signal wiring.

[Claim 13] Said height is ink jet equipment indicated they to be [ any of claim 9 to claim 12 characterized by being said connection electrode and the corresponding dummy electrode of a configuration ].

[Claim 14] Said delivery is ink jet equipment given in any of claim 9 to claim 13 characterized by having continued and arranged to full [ of the print field of a print medium ] they are.

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[Translation done.]



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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the ink jet equipment using the ink jet cartridge and ink jet head incorporating the ink jet head equipped with the energy generation component unit which has an energy generation component for breathing out a liquid and printing on a print medium, and the driver element unit which has a driver element for making this energy generation component drive, and this ink jet head.

[0002]

[Description of the Prior Art] By making the processing liquid for adjusting the property of ink or this ink from the delivery arranged by the ink jet head breathe out, and making this adhere to print media, such as paper, it is the approach of printing, the ink jet printing method has very little generating of the noise, and a high-speed print is possible for it. Making heat energy act on a liquid especially, by heating a liquid rapidly, air bubbles are generated, the liquid in a liquid flow channel is injected as a drop from a delivery by the cubical expansion of these air bubbles, and the ink jet head of the gestalt which introduced the liquid in the liquid flow channel from the liquid room at the time of dissipation of air bubbles has advantages, like that the responsibility over a print signal is good, and the formation of a high multi-head is easy.

[0003] The appearance of the energy generation unit of such an ink jet head is shown in drawing 11 , and the condition of having fractured the part is shown in drawing 12 . That is, the exoergic resistor 102 as an electric thermal-conversion component which is an energy generation component is formed on the insulating layer formed in the front face of a substrate 101, and the electrode which is not illustrated for energizing to this exoergic resistor 102 further is arranged. One of these carries out opening of the liquid flow channel 103 which the exoergic resistor 102 on this substrate 101 faces, it serves as a delivery 104, and another side is opening it for free passage in the common liquid room 105. The liquid tank which is independently attached to an ink jet head and which is not illustrated is connected with this common liquid room 105 through the bond part material 106.

[0004] When incorporating the exoergic resistor 102 every liquid flow channel 103 which is open for free passage to the delivery 104 arranged in the shape of a straight line, respectively and performing the print of two or more dots simultaneously to a print medium so that it may illustrate, it is necessary to control ON/OFF of energization according to an individual to the exoergic resistor 102. It includes in the energy generation component unit 107 mentioned above in one, or the driver element for performing such control is drawing 13 and its XIV-XIV. As shown in drawing 14 showing view cross-section structure, there is the approach of connecting with the energy generation component unit 107 electrically through a bonding wire 108.

[0005] However, when the energy generation component unit 107 and a driver element 109 are connected in the state of immobilization by the bonding wire 108 and a defect occurs in at least any of the exoergic resistor 102 and a driver element 109, or one side, there is a problem of the whole ink jet head stopping operating.

[0006] In order to solve such a problem, using the driver element unit 110 which has the driver element 109 as shown in drawing 15 , this driver element unit 110 and the energy generation component unit 107 are made disengageable, as shown in drawing 16 , these connection electrodes 111 and 112 are piled up and stuck mutually, and the ink jet head of the type which connects electrically, and the ink jet equipment using this ink jet head are proposed.

[0007] In order for what is necessary just to be to exchange only the energy generation component unit 107 for a new thing, and to connect with the driver element unit 110, when failure arises to the energy generation component unit 107 when the exchange-type energy generation component unit 107 mentioned above is used, or a print activity becomes impossible by the life, it is very advantageous in cost.

[0008]

[Problem(s) to be Solved by the Invention] In the ink jet head on which you make it put the energy generation component unit 107 and each other's driver element unit 110 disengageable, and it was made to stick them as shown in drawing 16 Only the corresponding number is installed, respectively with the exoergic resistor 102 to which these connection electrodes 111 and 112 carry out the regurgitation of the ink actually. In order to demonstrate thoroughly the function and engine performance as an ink jet head, these connection electrode 111 and all of 112 need to be connected certainly.

[0009] However, the connection electrode 111 which projects from each unit 107, the abutting surface 113 of 110, and 114 in the conventional thing, and the height of 112 and the ununiformity of a configuration, Or if it originates in the ununiformity of the thrust at the time of adhesion actuation, and a faulty connection may happen, and also the point of application of thrust shifts from between the connection electrode 111 and 112 at the time of a unit 107 and junction of 110 as shown in drawing 17 As a result of the moment force's centering on the connection electrode 111,112 occurring between a unit 107 and 110, there were the connection electrode 111 and a possibility that a faulty connection might occur among 112.

[0010]

[Objects of the Invention] The object of this invention is about the electrical installation of the energy generation component unit of a disengageable gestalt, and a driver element unit to offer [ certain and ] the ink jet equipment using the ink jet cartridge and ink jet head incorporating the ink jet head it enabled it to perform by being stabilized, and this ink jet head.

[0011]

[Means for Solving the Problem] An abutting surface is formed while having two or more signal wiring for an end side to connect a liquid to two or more energy generation components for carrying out the regurgitation, respectively, and for the 1st gestalt by this invention supply an electrical signal to these energy generation component. The energy generation component unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively, An abutting surface is formed while having two or more signal wiring for an end side connecting with the driver element for driving said energy generation component, respectively, and sending out the electrical signal from the driver element concerned. It has the driver element unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively. It is the ink jet head which piles up said abutting surface of said energy generation component unit and said driver element unit mutually, and connected said connection electrode mutually. It is in the ink jet head characterized by forming the height for holding these opposite spacing in said one [ at least ] abutting surface of said energy generation component unit and said driver element unit.

[0012] Moreover, an abutting surface is formed while having two or more signal wiring for an end side to connect a liquid to two or more energy generation components for carrying out the regurgitation, respectively, and for the second gestalt by this invention supply an electrical signal to these energy generation component. The energy generation component unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively, An abutting surface is formed while having two or more signal wiring for an end side connecting with the

driver element for driving said energy generation component, respectively, and sending out the electrical signal from the driver element concerned. It has the driver element unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively. The ink jet head which piles up said abutting surface of said energy generation component unit and said driver element unit mutually, and connected said connection electrode mutually, It is the ink jet cartridge equipped with the liquid tank in which said liquid for supplying this ink jet head is stored. It is in the ink jet cartridge characterized by forming the height for holding these opposite spacing in said one [ at least ] abutting surface of said energy generation component unit and said driver element unit.

[0013] Furthermore, an abutting surface is formed while having two or more signal wiring for an end side to connect a liquid to two or more energy generation components for carrying out the regurgitation from two or more deliveries, respectively, and for the 3rd gestalt of this invention supply an electrical signal to these energy generation component. The energy generation component unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively, An abutting surface is formed while having two or more signal wiring for an end side connecting with the driver element for driving said energy generation component, respectively, and sending out the electrical signal from the driver element concerned. It has the driver element unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively. It is ink jet equipment using the ink jet head which piles up said abutting surface of said energy generation component unit and said driver element unit mutually, and connected said connection electrode mutually. It is in the ink jet equipment characterized by forming the height for holding these opposite spacing in said one [ at least ] abutting surface of said energy generation component unit and said driver element unit.

[0014] When according to this invention the abutting surface of an energy generation component unit and a driver element unit is piled up mutually and a connection electrode is connected mutually electrically, the height for holding these opposite spacing is formed, these abutting surfaces will be in a right pair condition, and all connection electrodes will contact correctly one [ at least ] abutting surface of an energy generation component unit and a driver element unit.

[0015] The electrical signal sent out through the signal wiring from the driver element of a driver element unit is supplied to an energy generation component from the signal wiring of an energy generation component unit through a connection electrode, an energy generation component starts by this, and a liquid is breathed out.

[0016]

[Embodiment of the Invention] In the ink jet head by the 1st gestalt of this invention said height The field which may have the field located in a line a connection electrode and in the shape of a straight line, may have the field located in a line along the array direction of a connection electrode on the extension by the side of the other end of signal wiring, and is located in a line a connection electrode and in the shape of a straight line, You may have the field located in a line along the array direction of a connection electrode on the extension by the side of the other end of signal wiring. Moreover, heights may be a connection electrode and the corresponding dummy electrode of a configuration, and an energy generation component may be an electric thermal-conversion object which generates the heat energy which makes a liquid produce film boiling.

[0017] As for said liquid, in the ink jet cartridge by the 2nd gestalt of this invention, it is desirable that they are the processing liquid which adjusts the property of ink and the ink breathed out by the print medium or these ink, and processing liquid.

[0018] Here, said height may have the field located in a line a connection electrode and in the shape of a straight line, may have the field located in a line along the array direction of a connection electrode on the extension by the side of the other end of signal wiring, and may have the field located in a line a connection electrode and in the shape of a straight line, and the field located in a line along the array direction of a connection electrode on the extension by the side of the other end of signal wiring. Moreover, heights may be a connection electrode and the corresponding dummy electrode of a

configuration, and the delivery may be continued and arranged to full [ of the print field of a print medium ].

[0019]

[Example] Although some of examples of the ink jet head by this invention are explained to a detail, referring to drawing 1 - drawing 8 , the fundamental structure of the part of a connection electrode prepared in the energy generation component unit and driver element unit which constitute this ink jet head, respectively can completely make both these units into the same gestalt.

[0020] Therefore, although only the energy generation component unit which is one unit is explained below, the structure of the connection polar zone of a driver element unit can also adopt the completely same structure.

[0021] As shown in drawing 2 showing drawing 1 showing the appearance on the front face of a substrate of the energy generation component unit in the 1st example, and its II-II view cross-section structure, in the front face of the substrate 11 which makes a rectangle The insulating layer 12 which has accumulation nature, such as a silicon dioxide (SiO<sub>2</sub>), is formed, and two or more pairs connection electrode 13a, 13b, and the dummy electrode 14 have arranged in the shape of a straight line at intervals of predetermined along with that longitudinal direction on this insulating layer 12. and the front face of the substrate 11 around these connection electrode 13a, 13b, and the dummy electrode 14 -- abutting-surface FE of this invention \*\*\*\*\* -- it functions.

[0022] Connection electrode 13a of each set and 13b are formed in the end section of the signal wiring 15 by the aluminum prolonged in the cross direction (the inside of drawing 2 , longitudinal direction) of a substrate 11, and the other end of the signal wiring 15 of these each sets is mutually connected through the exoergic resistor 16 by the 2 HOU-ized hafnium (HfB<sub>2</sub>) as an energy generation component etc., and they are making the U character-like gestalt as a whole, respectively. These connection electrode 13a and 13b are in the condition that the laminating was carried out on resistive layer 16' and signal wiring 15, except for these connection electrodes 13a and 13b, resistive layer 16' and signal wiring 15 are covered with the oxidation-resistant insulating layer 17 by a silicon dioxide etc., and the laminating of the cavitation-proof layer 18 by a tantalum etc. is further carried out on the exoergic resistor 16 through the insulating layer 17.

[0023] The dummy electrode 14 as a height of this invention is in the condition that the laminating was carried out on resistive layer 16' and conductive layer 15', like connection electrode 13a further arranged and mentioned above to these and parallel along the array direction of connection electrode 13a and 13b at the cross-direction end side of a substrate 11 rather than connection electrode 13a and 13b, and 13b. And these resistive layer 16' and conductive layer 15' are in the condition of having been covered with the insulating layer 17 except for the dummy electrode 14.

[0024] If the manufacture procedure of the substrate 11 of such structure is explained, first, an insulating layer 12, resistive layer 16', and conductive layer 15' will be carried out in sputtering on the front face of a substrate 11, and will carry out laminating formation at order by the thickness of 2 micrometers, 0.2 micrometer, and 0.6 micrometer, respectively (refer to drawing 3 ).

[0025] And pattern formation of resistive layer 16' and conductive layer 15' for the dummy electrode 14 is carried out to the exoergic resistor 16 and signal wiring 15 using the technique of photograph RISOGURAFU by etching of resistive layer 16' and conductive layer 15' (refer to drawing 4 ).

[0026] After an appropriate time, an insulator layer and the cavitation-proof film are carried out in sputtering on these front faces, laminating formation is carried out by the thickness of 0.9 micrometer and 0.5 micrometer at order, respectively, and pattern formation of an insulating layer 17 and the cavitation-proof layer 18 is carried out by etching of an insulator layer and the cavitation-proof film using the technique of photograph RISOGURAFU. At this time, etching processing of a part of insulating layer 17 is carried out so that the through hole 19 facing the front face of signal wiring 15 and the front face of conductive layer 15' corresponding to the dummy electrode 14, respectively may be formed (refer to drawing 5 ).

[0027] Furthermore, titanium and copper are formed as a electroplating under-coating layer in order of 0.05 micrometer and 0.3 micrometer, respectively. Subsequently, it is gold by electroplating after

performing pattern formation using the resist for plating formation, Nickel, Copper, Platinum etc. is formed by several micrometers to dozens of micrometers thickness. And while exfoliating a resist, an under-coating layer is etched, and connection electrode 13a, 13b, and the dummy electrode 14 are formed in the part of a through hole 19 as shown in drawing 2.

[0028] Thus, the delivery 104, the ink passage 103, the common ink room 105 as shown in drawing 12, etc. were formed to the obtained substrate 11, the \*\*\*\* bond part material 106 further shown in drawing 11 was joined, and the energy generation component unit was created.

[0029] As shown in drawing 6 showing the appearance of the ink jet head by attachment by this energy generation component unit and the driver element unit energy generation component unit UE with which connection electrode 13a, 13b, and the dummy electrode 14 project Abutting-surface FE Driver element unit UD with which the connection electrode 20 and the dummy electrode 21 project Abutting-surface FD Superposition, If the point of application of these junction force is between connection electrode 13a, 13b, 20, and the dummy electrode 14 and 21 when such connection electrode 13a, 13b, and 20 are connected mutually Abutting surface FE and FD It is mutually maintained by parallel and connection electrode 13a, 13b, and 20 can be held in the good connection condition. In this case, if it can be desirable to make equal the projection height of connection electrode 13a from the front face of a substrate 11, 13b, and the dummy electrode 14 and it can fulfill such conditions, it replaces with the dummy electrode 14 and you may make it form another lobe.

[0030] Thus, it is the energy generation component unit UE by forming the dummy electrode 14 and 21. Driver element unit UD The tolerance of a location gap of the point of application at the time of joining can extend rather than the conventional thing shown in drawing 16 and drawing 17, and it is these energy generation component unit UE. And driver element unit UD A positioning device etc. can be simplified more and low cost-ization can be attained.

[0031] Although the dummy electrode 14 was further formed along the array direction of connection electrode 13a and 13b in the example mentioned above by the cross-direction end side of a substrate 11 rather than connection electrode 13a and 13b You may make it form dummy electrode 14a and 14b so that it may rank with the ends side which met in the array direction of the longitudinal direction both ends of a substrate 11, i.e., connection electrode 13a, and 13b these and in the shape of a straight line as shown in drawing 7 showing the appearance on the front face of a substrate in the second example of this invention. Furthermore, as shown in drawing 8 showing the appearance on the front face of a substrate in the third example of this invention While combining these two examples and forming [ rather than the connection electrodes 13a and 13b ] the dummy electrode 14 along the array direction of connection electrode 13a and 13b by the cross-direction end side of a substrate 11 further You may make it form dummy electrode 14a and 14b in the longitudinal direction both ends of the substrate 11 which met in the array direction of connection electrode 13a and 13b so that it may stand in a line these connection electrode 13a, 13b, and in the shape of a straight line.

[0032] In addition, in these drawing 7 and drawing 8, the same sign as this is described at the member of the same function as the previous example shown in drawing 1.

[0033] Next, it explains to a detail, referring to drawing 9 showing the appearance about one example of the ink jet cartridge by this invention incorporating an ink jet head which was mentioned above.

[0034] That is, the ink jet cartridge 31 in this example is attached in the carriage of the ink jet equipment of the serial type which is not illustrated in the state of positioning, and an electric signal etc. is delivered and received between ink jet equipment. The ink jet cartridge 31 for which it is exchanged removable to carriage The ink jet head 10 and the head holder 32 holding this ink jet head 10, The press block 33 which presses the ink jet head 10 to this head holder 32, The body consists of an ink tank 34 which holds ink, and covering device material 35 which seals the inside of this ink tank 34. The atmospheric-air free passage opening 36 for holding the inside of this ink tank 34 to atmospheric pressure is formed in the ink tank 34 which occupies most volume of the ink jet cartridge 31.

[0035] The ink jet head 10 in which many ink deliveries 104 for carrying out the regurgitation of the ink were formed has the example shown in previous drawing 1 - drawing 8, and the corresponding structure, and press maintenance of this ink jet head 10 is carried out by the press block 33 at the head

holder 32. Ink is led to the common ink room 105 and each ink passage 103 through the ink supply pipe and free passage way which the ink jet head 10 does not illustrate from the ink tank 34 (refer to drawing 12 , respectively).

[0036] Although the ink jet cartridge 31 in this example forms the ink jet head 10 and the ink tank 34 in one, it may be an ink jet cartridge of the structure which connected the ink tank 34 side exchangeable to this ink jet head 10.

[0037] Furthermore, the appearance of one example of the ink jet equipment by this invention which carried the ink jet head of this invention is shown in drawing 10 . Namely, the ink jet equipment of this example It is a full line type color printer. An ink jet cartridge Yellow color ink, Magenta color ink, Cyanogen color ink, four ink tank 37Y which stored black color ink, respectively, 37M, 37C, and 37B (these are hereafter described to be the ink tanks 37 collectively), Four ink jet head 10Y which an ink supply pipe connects to these ink tank 37 through connecting piping 38, respectively, 10M, 10C, 10B (These are hereafter described collectively to be the ink jet heads 10) It has and each ink tank 37 is connected exchangeable to connecting piping 38.

[0038] The ink jet head 10 of the thing of the example shown in drawing 1 -8 and fundamental structure to which ON/OFF of the energization to each exoergic resistor 16 are switched by the head driver 40 linked to a control device 39, respectively is completely the same, and it has arranged at intervals of predetermined along the conveyance direction of the belt 41 for conveyance so that it may counter with a platen 42 on both sides of the endless belt 41 for conveyance. And it can go up and down now in the opposite direction with a platen 42 with the head migration means 43 for the recovery by which actuation is controlled by the control unit 39. In the side of each ink jet head 10, the print activity over the print form 44 is preceded. It is arranged after the head cap 45 for breathing out the old ink which intervenes in the ink passage 103 from the ink delivery 24, and performing recovery of the ink jet head 10 has half-pitch \*\* carried out to array spacing of the ink jet head 10. With a cap migration means 46 by which actuation is controlled by the control device 39, it moves directly under the ink jet head 10, respectively, and the waste ink breathed out from the ink delivery 24 is received.

[0039] The actuation is switched by Motor Driver 49 which the belt 41 for conveyance which conveys the print form 44 is almost wound around the driving roller 48 connected with the belt drive motor 47, and is connected to a control device 39. Moreover, by charging this belt 41 for conveyance, the electrification machine 50 for sticking the print form 44 to the belt 41 for conveyance is formed, and ON/OFF of that energization are switched to the upstream of the belt 41 for conveyance by the electrification machine driver 51 which connects this electrification machine 50 to a control device 39. The motor 53 for feeding for carrying out the actuation revolution of the feed roller 52 of these couples is connected with the feed roller 52 of the couple for supplying the print form 44 on the belt 41 for conveyance, and actuation is switched to it by Motor Driver 54 which connects this motor 53 for feeding to a control device 39.

[0040] Therefore, after going up in advance of the print activity over the print form 44 so that the ink jet head 10 may separate from a platen 42, and the head cap 45 moving subsequently to directly under [ of these ink jet head 10 ] and performing recovery of the ink jet head 10, the head cap 45 is moved to the original position in readiness, and the ink jet head 10 is further moved to a platen 42 side to a print position. And the belt 41 for conveyance is driven at the same time it operates the electrification machine 50, the print form 44 is further laid on the belt 41 for conveyance with the feed roller 52, and a predetermined color image is printed on the print form 44 by each ink jet head 10.

[0041] At each example mentioned above, it is the densification of a print, Although the ink jet head using the electric thermal-conversion component which generates heat energy as an energy generation component was explained in order to attain highly minute-ization, it is applicable also to the ink jet head using electric machine sensing elements, such as a piezoelectric device.

[0042] the typical configuration and typical principle of the ink jet head using an above-mentioned electric thermal-conversion component and an above-mentioned laser beam -- United States patent 4th, 723, and a No. 129 description -- said -- what is performed using the fundamental principle currently indicated by the 4th, 740, and the No. 796 description is desirable. Although this method is applicable to



both the so-called mold on demand and a continuous system For the electric thermal-conversion component which is especially arranged corresponding to the sheet and liquid flow channel by which the liquid is held in the case of the mold on demand By impressing at least one driving signal which gives the rapid temperature rise which supports print information and exceeds nucleate boiling Since make an electric thermal-conversion component generate heat energy, the heat operating surface of an ink jet head is made to produce film boiling and the air bubbles in the liquid corresponding to this driving signal can be formed by one to one as a result, it is effective. A liquid is made to breathe out through opening for regurgitation by growth and contraction of these air bubbles, and at least one drop is formed. If this driving signal is made into a pulse configuration, since growth contraction of air bubbles will be performed appropriately instantly, the regurgitation of a liquid excellent in especially responsibility can be attained, and it is more desirable. as the driving signal of this pulse configuration -- United States patent 4th, 463, and a No. 359 description -- said -- what is indicated by the 4th, 345, and the No. 262 description is suitable. In addition, if the conditions indicated by United States patent 4th of invention about the rate of a temperature rise of the above-mentioned heat operating surface, 313, and the No. 124 description are adopted, the further excellent print can be performed.

[0043] The configuration using United States patent 4th which indicates the configuration arranged to the field to which the heat operation section other than a combination configuration (a straight-line-like liquid flow channel or right-angle liquid flow channel) with a delivery, a liquid flow channel, and an electric thermal-conversion component which are indicated by each above-mentioned description is crooked as a configuration of an ink jet head, 558, a No. 333 description, and United States patent 4th, 459 and a No. 600 description is also included in this invention. In addition, the effectiveness of this invention is effective also as a configuration based on JP,59-123670,A which indicates the configuration which uses a common slit as the discharge part of an electric thermal-conversion component to two or more electric thermal-conversion components, and JP,59-138461,A which indicated the configuration whose puncturing which absorbs the pressure wave of heat energy is made to correspond to a discharge part. Namely, no matter the gestalt of an ink jet head may be what thing, it is because it can print now efficiently certainly according to this invention.

[0044] Furthermore, this invention is effectively applicable also to the ink jet head of the full line type which has the die length corresponding to the maximum width of the print medium which can print ink jet equipment. As such an ink jet head, any of the configuration which fills the die length with the combination of two or more ink jet heads, and the configuration as one ink jet head formed in one are sufficient.

[0045] In addition, this invention is effective also when the thing of a serial type like the example of a top also uses the ink jet head fixed to the body of equipment, the exchangeable chip type ink jet head to which the electric connection with the body of equipment and supply of the liquid from the body of equipment are attained by the body of equipment being equipped, or the ink-jet head of the cartridge type with which the liquid tank was formed in the ink jet head itself in one.

[0046] Moreover, as a configuration of the ink jet equipment of this invention, since the effectiveness of this invention can be stabilized further, it is desirable to add the regurgitation recovery means of an ink jet head, a preliminary auxiliary means, etc. The capping means and cleaning means against an ink jet head if these are mentioned concretely, Application of pressure or attraction means, A preheating means to heat using an electric thermal-conversion component, heating elements different from this, or such combination, and an auxiliary discharge appearance means to perform the regurgitation different from a print can be mentioned.

[0047] Moreover, although only one piece was prepared also about the class and the number of an ink jet head which are carried, for example corresponding to monochromatic ink, corresponding to two or more ink which differs in others and print color or concentration, more than one may be prepared the number of pieces. That is, this invention is very effective not only in the printing mode of only which mainstream color black, for example as a printing mode of ink jet equipment but equipment equipped with at least one of each of the full color printing mode by the double color color of a color or color mixture which is different in whether an ink jet head is constituted in one, or it is based on two or more



combination although any are sufficient.

[0048] Furthermore, in addition, in this invention example explained above, although the liquid is explained as a liquid It is the liquid solidified less than [ a room temperature or it ], and what is softened or liquefied at a room temperature may be used. Or by the ink jet method, since what carries out temperature control is common as a temperature control is performed for the liquid itself within the limits of 30 degrees C or more 70 degrees C or less and it is in the stability regurgitation range about the viscosity of a liquid, a liquid may use what makes the shape of liquid at the time of activity print signal grant. In addition, in order to prevent the temperature up by heat energy positively by making it use it as energy of the change of state from a solid condition to the liquid condition of a liquid, or in order to prevent evaporation of a liquid, the liquid which solidifies in the state of neglect and is liquefied with heating may be used. Anyway, a liquid liquefies by grant according to the print signal of heat energy, and this invention can be applied also when using the liquid of the property which will not be liquefied without grant of heat energy, such as that by which a liquefied liquid is breathed out, and a thing which it already begins to solidify when reaching a print medium. The liquid in such a case is good for a porosity sheet crevice or a breakthrough which is indicated by JP,54-56847,A or JP,60-71260,A also as liquefied or a gestalt which counters to an electric thermal-conversion component in the condition of having been held as a solid. In this invention, the most effective thing performs the film-boiling method mentioned above to each liquid mentioned above.

[0049] Furthermore, in addition, as a gestalt of the ink jet equipment concerning this invention using the ink jet head mentioned above, although used as an image printing terminal of information management systems, such as a computer, the gestalt of the reproducing unit combined with others, a reader, etc. and the facsimile apparatus which has a transceiver function further may be taken.

[0050]

[Effect of the Invention] Since the height for holding opposite spacing of the abutting surface of an energy generation component unit and a driver element unit was prepared according to this invention, the adhesion condition of the connection electrode of these two units is equalized, and certainly reliable electrical installation becomes easily possible.

[0051] Moreover, since it is rough and good compared with the former, positive connection is possible for the location of the application-of-pressure point of application at the time of connecting an energy generation component unit and a driver element unit by the simpler device, and it can attain low cost-ization.

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**TECHNICAL FIELD**

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[Field of the Invention] This invention relates to the ink jet equipment using the ink jet cartridge and ink jet head incorporating the ink jet head equipped with the energy generation component unit which has an energy generation component for breathing out a liquid and printing on a print medium, and the driver element unit which has a driver element for making this energy generation component drive, and this ink jet head.

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PRIOR ART

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[Description of the Prior Art] By making the processing liquid for adjusting the property of ink or this ink from the delivery arranged by the ink jet head breathe out, and making this adhere to print media, such as paper, it is the approach of printing, the ink jet printing method has very little generating of the noise, and a high-speed print is possible for it. Making heat energy act on a liquid especially, by heating a liquid rapidly, air bubbles are generated, the liquid in a liquid flow channel is injected as a drop from a delivery by the cubical expansion of these air bubbles, and the ink jet head of the gestalt which introduced the liquid in the liquid flow channel from the liquid room at the time of dissipation of air bubbles has advantages, like that the responsibility over a print signal is good, and the formation of a high multi-head is easy.

[0003] The appearance of the energy generation unit of such an ink jet head is shown in drawing 11, and the condition of having fractured the part is shown in drawing 12. That is, the exoergic resistor 102 as an electric thermal-conversion component which is an energy generation component is formed on the insulating layer formed in the front face of a substrate 101, and the electrode which is not illustrated for energizing to this exoergic resistor 102 further is arranged. One of these carries out opening of the liquid flow channel 103 which the exoergic resistor 102 on this substrate 101 faces, it serves as a delivery 104, and another side is opening it for free passage in the common liquid room 105. The liquid tank which is independently attached to an ink jet head and which is not illustrated is connected with this common liquid room 105 through the bond part material 106.

[0004] When incorporating the exoergic resistor 102 every liquid flow channel 103 which is open for free passage to the delivery 104 arranged in the shape of a straight line, respectively and performing the print of two or more dots simultaneously to a print medium so that it may illustrate, it is necessary to control ON/OFF of energization according to an individual to the exoergic resistor 102. It includes in the energy generation component unit 107 mentioned above in one, or the driver element for performing such control is drawing 13 and its XIV-XIV. As shown in drawing 14 showing view cross-section structure, there is the approach of connecting with the energy generation component unit 107 electrically through a bonding wire 108.

[0005] However, when the energy generation component unit 107 and a driver element 109 are connected in the state of immobilization by the bonding wire 108 and a defect occurs in at least any of the exoergic resistor 102 and a driver element 109, or one side, there is a problem of the whole ink jet head stopping operating.

[0006] In order to solve such a problem, using the driver element unit 110 which has the driver element 109 as shown in drawing 15, this driver element unit 110 and the energy generation component unit 107 are made disengageable, as shown in drawing 16, these connection electrodes 111 and 112 are piled up and stuck mutually, and the ink jet head of the type which connects electrically, and the ink jet equipment using this ink jet head are proposed.

[0007] In order for what is necessary just to be to exchange only the energy generation component unit 107 for a new thing, and to connect with the driver element unit 110, when failure arises to the energy generation component unit 107 when the exchange-type energy generation component unit 107

mentioned above is used, or a print activity becomes impossible by the life, it is very advantageous in cost.

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EFFECT OF THE INVENTION

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[Effect of the Invention] Since the height for holding opposite spacing of the abutting surface of an energy generation component unit and a driver element unit was prepared according to this invention, the adhesion condition of the connection electrode of these two units is equalized, and certainly reliable electrical installation becomes easily possible.

[0051] Moreover, since it is rough and good compared with the former, positive connection is possible for the location of the application-of-pressure point of application at the time of connecting an energy generation component unit and a driver element unit by the simpler device, and it can attain low cost-ization.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] In the ink jet head on which you make it put the energy generation component unit 107 and each other's driver element unit 110 disengageable, and it was made to stick them as shown in drawing 16 Only the corresponding number is installed, respectively with the exoergic resistor 102 to which these connection electrodes 111 and 112 carry out the regurgitation of the ink actually. In order to demonstrate thoroughly the function and engine performance as an ink jet head, these connection electrode 111 and all of 112 need to be connected certainly.

[0009] However, the connection electrode 111 which projects from each unit 107, the abutting surface 113 of 110, and 114 in the conventional thing, and the height of 112 and the ununiformity of a configuration, Or if it originates in the ununiformity of the thrust at the time of adhesion actuation, and a faulty connection may happen, and also the point of application of thrust shifts from between the connection electrode 111 and 112 at the time of a unit 107 and junction of 110 as shown in drawing 17 As a result of the moment force's centering on the connection electrode 111,112 occurring between a unit 107 and 110, there were the connection electrode 111 and a possibility that a faulty connection might occur among 112.

[0010]

[Objects of the Invention] The object of this invention is about the electrical installation of the energy generation component unit of a disengageable gestalt, and a driver element unit to offer [ certain and ] the ink jet equipment using the ink jet cartridge and ink jet head incorporating the ink jet head it enabled it to perform by being stabilized, and this ink jet head.

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**MEANS**

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[Means for Solving the Problem] An abutting surface is formed while having two or more signal wiring for an end side to connect a liquid to two or more energy generation components for carrying out the regurgitation, respectively, and for the 1st gestalt by this invention supply an electrical signal to these energy generation component. The energy generation component unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively, An abutting surface is formed while having two or more signal wiring for an end side connecting with the driver element for driving said energy generation component, respectively, and sending out the electrical signal from the driver element concerned. It has the driver element unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively. It is the ink jet head which piles up said abutting surface of said energy generation component unit and said driver element unit mutually, and connected said connection electrode mutually. It is in the ink jet head characterized by forming the height for holding these opposite spacing in said one [ at least ] abutting surface of said energy generation component unit and said driver element unit.

[0012] Moreover, an abutting surface is formed while having two or more signal wiring for an end side to connect a liquid to two or more energy generation components for carrying out the regurgitation, respectively, and for the second gestalt by this invention supply an electrical signal to these energy generation component. The energy generation component unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively, An abutting surface is formed while having two or more signal wiring for an end side connecting with the driver element for driving said energy generation component, respectively, and sending out the electrical signal from the driver element concerned. It has the driver element unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively. The ink jet head which piles up said abutting surface of said energy generation component unit and said driver element unit mutually, and connected said connection electrode mutually, It is the ink jet cartridge equipped with the liquid tank in which said liquid for supplying this ink jet head is stored. It is in the ink jet cartridge characterized by forming the height for holding these opposite spacing in said one [ at least ] abutting surface of said energy generation component unit and said driver element unit.

[0013] Furthermore, an abutting surface is formed while having two or more signal wiring for an end side to connect a liquid to two or more energy generation components for carrying out the regurgitation from two or more deliveries, respectively, and for the 3rd gestalt of this invention supply an electrical signal to these energy generation component. The energy generation component unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this abutting surface, respectively, An abutting surface is formed while having two or more signal wiring for an end side connecting with the driver element for driving said energy generation component, respectively, and sending out the electrical signal from the driver element concerned. It has the driver element unit which protruded two or more connection electrodes on the other end side of said signal wiring located in this



abutting surface, respectively. It is ink jet equipment using the ink jet head which piles up said abutting surface of said energy generation component unit and said driver element unit mutually, and connected said connection electrode mutually. It is in the ink jet equipment characterized by forming the height for holding these opposite spacing in said one [ at least ] abutting surface of said energy generation component unit and said driver element unit.

[0014] When according to this invention the abutting surface of an energy generation component unit and a driver element unit is piled up mutually and a connection electrode is connected mutually electrically, the height for holding these opposite spacing is formed, these abutting surfaces will be in a right pair condition, and all connection electrodes will contact correctly one [ at least ] abutting surface of an energy generation component unit and a driver element unit.

[0015] The electrical signal sent out through the signal wiring from the driver element of a driver element unit is supplied to an energy generation component from the signal wiring of an energy generation component unit through a connection electrode, an energy generation component starts by this, and a liquid is breathed out.

[0016]

[Embodiment of the Invention] In the ink jet head by the 1st gestalt of this invention said height The field which may have the field located in a line a connection electrode and in the shape of a straight line, may have the field located in a line along the array direction of a connection electrode on the extension by the side of the other end of signal wiring, and is located in a line a connection electrode and in the shape of a straight line, You may have the field located in a line along the array direction of a connection electrode on the extension by the side of the other end of signal wiring. Moreover, heights may be a connection electrode and the corresponding dummy electrode of a configuration, and an energy generation component may be an electric thermal-conversion object which generates the heat energy which makes a liquid produce film boiling.

[0017] As for said liquid, in the ink jet cartridge by the 2nd gestalt of this invention, it is desirable that they are the processing liquid which adjusts the property of ink and the ink breathed out by the print medium or these ink, and processing liquid.

[0018] Here, said height may have the field located in a line a connection electrode and in the shape of a straight line, may have the field located in a line along the array direction of a connection electrode on the extension by the side of the other end of signal wiring, and may have the field located in a line a connection electrode and in the shape of a straight line, and the field located in a line along the array direction of a connection electrode on the extension by the side of the other end of signal wiring. Moreover, heights may be a connection electrode and the corresponding dummy electrode of a configuration, and the delivery may be continued and arranged to full [ of the print field of a print medium ].

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[Translation done.]

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EXAMPLE

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[Example] Although some of examples of the ink jet head by this invention are explained to a detail, referring to drawing 1 - drawing 8, the fundamental structure of the part of a connection electrode prepared in the energy generation component unit and driver element unit which constitute this ink jet head, respectively can completely make both these units into the same gestalt.

[0020] Therefore, although only the energy generation component unit which is one unit is explained below, the structure of the connection polar zone of a driver element unit can also adopt the completely same structure.

[0021] As shown in drawing 2 showing drawing 1 showing the appearance on the front face of a substrate of the energy generation component unit in the 1st example, and its II-II view cross-section structure, in the front face of the substrate 11 which makes a rectangle The insulating layer 12 which has accumulation nature, such as a silicon dioxide (SiO<sub>2</sub>), is formed, and two or more pairs connection electrode 13a, 13b, and the dummy electrode 14 have arranged in the shape of a straight line at intervals of predetermined along with that longitudinal direction on this insulating layer 12. and the front face of the substrate 11 around these connection electrode 13a, 13b, and the dummy electrode 14 -- abutting-surface FE of this invention \*\*\*\*\* -- it functions.

[0022] Connection electrode 13a of each set and 13b are formed in the end section of the signal wiring 15 by the aluminum prolonged in the cross direction (the inside of drawing 2, longitudinal direction) of a substrate 11, and the other end of the signal wiring 15 of these each sets is mutually connected through the exoergic resistor 16 by the 2 HOU-ized hafnium (HfB<sub>2</sub>) as an energy generation component etc., and they are making the U character-like gestalt as a whole, respectively. These connection electrode 13a and 13b are in the condition that the laminating was carried out on resistive layer 16' and signal wiring 15, except for these connection electrodes 13a and 13b, resistive layer 16' and signal wiring 15 are covered with the oxidation-resistant insulating layer 17 by a silicon dioxide etc., and the laminating of the cavitation-proof layer 18 by a tantalum etc. is further carried out on the exoergic resistor 16 through the insulating layer 17.

[0023] The dummy electrode 14 as a height of this invention is in the condition that the laminating was carried out on resistive layer 16' and conductive layer 15', like connection electrode 13a further arranged and mentioned above to these and parallel along the array direction of connection electrode 13a and 13b at the cross-direction end side of a substrate 11 rather than connection electrode 13a and 13b, and 13b. And these resistive layer 16' and conductive layer 15' are in the condition of having been covered with the insulating layer 17 except for the dummy electrode 14.

[0024] If the manufacture procedure of the substrate 11 of such structure is explained, first, an insulating layer 12, resistive layer 16', and conductive layer 15' will be carried out in sputtering on the front face of a substrate 11, and will carry out laminating formation at order by the thickness of 2 micrometers, 0.2 micrometer, and 0.6 micrometer, respectively (refer to drawing 3).

[0025] And pattern formation of resistive layer 16' and conductive layer 15' for the dummy electrode 14 is carried out to the exoergic resistor 16 and signal wiring 15 using the technique of photograph RISOGURAFU by etching of resistive layer 16' and conductive layer 15' (refer to drawing 4).

[0026] After an appropriate time, an insulator layer and the cavitation-proof film are carried out in sputtering on these front faces, laminating formation is carried out by the thickness of 0.9 micrometer and 0.5 micrometer at order, respectively, and pattern formation of an insulating layer 17 and the cavitation-proof layer 18 is carried out by etching of an insulator layer and the cavitation-proof film using the technique of photograph RISOGURAFU. At this time, etching processing of a part of insulating layer 17 is carried out so that the through hole 19 facing the front face of signal wiring 15 and the front face of conductive layer 15' corresponding to the dummy electrode 14, respectively may be formed (refer to drawing 5 ).

[0027] Furthermore, titanium and copper are formed as a electroplating under-coating layer in order of 0.05 micrometer and 0.3 micrometer, respectively. Subsequently, it is gold by electroplating after performing pattern formation using the resist for plating formation, Nickel, Copper, Platinum etc. is formed by several micrometers to dozens of micrometers thickness. And while exfoliating a resist, an under-coating layer is etched, and connection electrode 13a, 13b, and the dummy electrode 14 are formed in the part of a through hole 19 as shown in drawing 2 .

[0028] Thus, the delivery 104, the ink passage 103, the common ink room 105 as shown in drawing 12 , etc. were formed to the obtained substrate 11, the \*\*\*\* bond part material 106 further shown in drawing 11 was joined, and the energy generation component unit was created.

[0029] As shown in drawing 6 showing the appearance of the ink jet head by attachment by this energy generation component unit and the driver element unit energy generation component unit UE with which connection electrode 13a, 13b, and the dummy electrode 14 project Abutting-surface FE Driver element unit UD with which the connection electrode 20 and the dummy electrode 21 project Abutting-surface FD Superposition, If the point of application of these junction force is between connection electrode 13a, 13b, 20, and the dummy electrode 14 and 21 when such connection electrode 13a, 13b, and 20 are connected mutually Abutting surface FE and FD It is mutually maintained by parallel and connection electrode 13a, 13b, and 20 can be held in the good connection condition. In this case, if it can be desirable to make equal the projection height of connection electrode 13a from the front face of a substrate 11, 13b, and the dummy electrode 14 and it can fulfill such conditions, it replaces with the dummy electrode 14 and you may make it form another lobe.

[0030] Thus, it is the energy generation component unit UE by forming the dummy electrode 14 and 21. Driver element unit UD The tolerance of a location gap of the point of application at the time of joining can extend rather than the conventional thing shown in drawing 16 and drawing 17 , and it is these energy generation component unit UE. And driver element unit UD A positioning device etc. can be simplified more and low cost-ization can be attained.

[0031] Although the dummy electrode 14 was further formed along the array direction of connection electrode 13a and 13b in the example mentioned above by the cross-direction end side of a substrate 11 rather than connection electrode 13a and 13b You may make it form dummy electrode 14a and 14b so that it may rank with the ends side which met in the array direction of the longitudinal direction both ends of a substrate 11, i.e., connection electrode 13a, and 13b these and in the shape of a straight line as shown in drawing 7 showing the appearance on the front face of a substrate in the second example of this invention. Furthermore, as shown in drawing 8 showing the appearance on the front face of a substrate in the third example of this invention While combining these two examples and forming [ rather than the connection electrodes 13a and 13b ] the dummy electrode 14 along the array direction of connection electrode 13a and 13b by the cross-direction end side of a substrate 11 further You may make it form dummy electrode 14a and 14b in the longitudinal direction both ends of the substrate 11 which met in the array direction of connection electrode 13a and 13b so that it may stand in a line these connection electrode 13a, 13b, and in the shape of a straight line.

[0032] In addition, in these drawing 7 and drawing 8 , the same sign as this is described at the member of the same function as the previous example shown in drawing 1 .

[0033] Next, it explains to a detail, referring to drawing 9 showing the appearance about one example of the ink jet cartridge by this invention incorporating an ink jet head which was mentioned above.

[0034] That is, the ink jet cartridge 31 in this example is attached in the carriage of the ink jet equipment

of the serial type which is not illustrated in the state of positioning, and an electric signal etc. is delivered and received between ink jet equipment. The ink jet cartridge 31 for which it is exchanged removable to carriage The ink jet head 10 and the head holder 32 holding this ink jet head 10, The press block 33 which presses the ink jet head 10 to this head holder 32, The body consists of an ink tank 34 which holds ink, and covering device material 35 which seals the inside of this ink tank 34. The atmospheric-air free passage opening 36 for holding the inside of this ink tank 34 to atmospheric pressure is formed in the ink tank 34 which occupies most volume of the ink jet cartridge 31.

[0035] The ink jet head 10 in which many ink deliveries 104 for carrying out the regurgitation of the ink were formed has the example shown in previous drawing 1 - drawing 8 , and the corresponding structure, and press maintenance of this ink jet head 10 is carried out by the press block 33 at the head holder 32. Ink is led to the common ink room 105 and each ink passage 103 through the ink supply pipe and free passage way which the ink jet head 10 does not illustrate from the ink tank 34 (refer to drawing 12 , respectively).

[0036] Although the ink jet cartridge 31 in this example forms the ink jet head 10 and the ink tank 34 in one, it may be an ink jet cartridge of the structure which connected the ink tank 34 side exchangeable to this ink jet head 10.

[0037] Furthermore, the appearance of one example of the ink jet equipment by this invention which carried the ink jet head of this invention is shown in drawing 10 . Namely, the ink jet equipment of this example It is a full line type color printer. An ink jet cartridge Yellow color ink, Magenta color ink, Cyanogen color ink, four ink tank 37Y which stored black color ink, respectively, 37M, 37C, and 37B (these are hereafter described to be the ink tanks 37 collectively), Four ink jet head 10Y which an ink supply pipe connects to these ink tank 37 through connecting piping 38, respectively, 10M, 10C, 10B (These are hereafter described collectively to be the ink jet heads 10) It has and each ink tank 37 is connected exchangeable to connecting piping 38.

[0038] The ink jet head 10 of the thing of the example shown in drawing 1 -8 and fundamental structure to which ON/OFF of the energization to each exoergic resistor 16 are switched by the head driver 40 linked to a control device 39, respectively is completely the same, and it has arranged at intervals of predetermined along the conveyance direction of the belt 41 for conveyance so that it may counter with a platen 42 on both sides of the endless belt 41 for conveyance. And it can go up and down now in the opposite direction with a platen 42 with the head migration means 43 for the recovery by which actuation is controlled by the control unit 39. In the side of each ink jet head 10, the print activity over the print form 44 is preceded. It is arranged after the head cap 45 for breathing out the old ink which intervenes in the ink passage 103 from the ink delivery 24, and performing recovery of the ink jet head 10 has half-pitch \*\* carried out to array spacing of the ink jet head 10. With a cap migration means 46 by which actuation is controlled by the control device 39, it moves directly under the ink jet head 10, respectively, and the waste ink breathed out from the ink delivery 24 is received.

[0039] The actuation is switched by Motor Driver 49 which the belt 41 for conveyance which conveys the print form 44 is almost wound around the driving roller 48 connected with the belt drive motor 47, and is connected to a control device 39. Moreover, by charging this belt 41 for conveyance, the electrification machine 50 for sticking the print form 44 to the belt 41 for conveyance is formed, and ON/OFF of that energization are switched to the upstream of the belt 41 for conveyance by the electrification machine driver 51 which connects this electrification machine 50 to a control device 39. The motor 53 for feeding for carrying out the actuation revolution of the feed roller 52 of these couples is connected with the feed roller 52 of the couple for supplying the print form 44 on the belt 41 for conveyance, and actuation is switched to it by Motor Driver 54 which connects this motor 53 for feeding to a control device 39.

[0040] Therefore, after going up in advance of the print activity over the print form 44 so that the ink jet head 10 may separate from a platen 42, and the head cap 45 moving subsequently to directly under [ of these ink jet head 10 ] and performing recovery of the ink jet head 10, the head cap 45 is moved to the original position in readiness, and the ink jet head 10 is further moved to a platen 42 side to a print position. And the belt 41 for conveyance is driven at the same time it operates the electrification

machine 50, the print form 44 is further laid on the belt 41 for conveyance with the feed roller 52, and a predetermined color image is printed on the print form 44 by each ink jet head 10.

[0041] At each example mentioned above, it is the densification of a print, Although the ink jet head using the electric thermal-conversion component which generates heat energy as an energy generation component was explained in order to attain highly minute-ization, it is applicable also to the ink jet head using electric machine sensing elements, such as a piezoelectric device.

[0042] the typical configuration and typical principle of the ink jet head using an above-mentioned electric thermal-conversion component and an above-mentioned laser beam -- United States patent 4th, 723, and a No. 129 description -- said -- what is performed using the fundamental principle currently indicated by the 4th, 740, and the No. 796 description is desirable. Although this method is applicable to both the so-called mold on demand and a continuous system For the electric thermal-conversion component which is especially arranged corresponding to the sheet and liquid flow channel by which the liquid is held in the case of the mold on demand By impressing at least one driving signal which gives the rapid temperature rise which supports print information and exceeds nucleate boiling Since make an electric thermal-conversion component generate heat energy, the heat operating surface of an ink jet head is made to produce film boiling and the air bubbles in the liquid corresponding to this driving signal can be formed by one to one as a result, it is effective. A liquid is made to breathe out through opening for regurgitation by growth and contraction of these air bubbles, and at least one drop is formed. If this driving signal is made into a pulse configuration, since growth contraction of air bubbles will be performed appropriately instancy, the regurgitation of a liquid excellent in especially responsibility can be attained, and it is more desirable. as the driving signal of this pulse configuration -- United States patent 4th, 463, and a No. 359 description -- said -- what is indicated by the 4th, 345, and the No. 262 description is suitable. In addition, if the conditions indicated by United States patent 4th of invention about the rate of a temperature rise of the above-mentioned heat operating surface, 313, and the No. 124 description are adopted, the further excellent print can be performed.

[0043] The configuration using United States patent 4th which indicates the configuration arranged to the field to which the heat operation section other than a combination configuration (a straight-line-like liquid flow channel or right-angle liquid flow channel) with a delivery, a liquid flow channel, and an electric thermal-conversion component which are indicated by each above-mentioned description is crooked as a configuration of an ink jet head, 558, a No. 333 description, and United States patent 4th, 459 and a No. 600 description is also included in this invention. In addition, the effectiveness of this invention is effective also as a configuration based on JP,59-123670,A which indicates the configuration which uses a common slit as the discharge part of an electric thermal-conversion component to two or more electric thermal-conversion components, and JP,59-138461,A which indicated the configuration whose puncturing which absorbs the pressure wave of heat energy is made to correspond to a discharge part. Namely, no matter the gestalt of an ink jet head may be what thing, it is because it can print now efficiently certainly according to this invention.

[0044] Furthermore, this invention is effectively applicable also to the ink jet head of the full line type which has the die length corresponding to the maximum width of the print medium which can print ink jet equipment. As such an ink jet head, any of the configuration which fills the die length with the combination of two or more ink jet heads, and the configuration as one ink jet head formed in one are sufficient.

[0045] In addition, this invention is effective also when the thing of a serial type like the example of a top also uses the ink jet head fixed to the body of equipment, the exchangeable chip type ink jet head to which the electric connection with the body of equipment and supply of the liquid from the body of equipment are attained by the body of equipment being equipped, or the ink-jet head of the cartridge type with which the liquid tank was formed in the ink jet head itself in one.

[0046] Moreover, as a configuration of the ink jet equipment of this invention, since the effectiveness of this invention can be stabilized further, it is desirable to add the regurgitation recovery means of an ink jet head, a preliminary auxiliary means, etc. The capping means and cleaning means against an ink jet head if these are mentioned concretely, Application of pressure or attraction means, A preheating means

to heat using an electric thermal-conversion component, heating elements different from this, or such combination, and an auxiliary discharge appearance means to perform the regurgitation different from a print can be mentioned.

[0047] Moreover, although only one piece was prepared also about the class and the number of an ink jet head which are carried, for example corresponding to monochromatic ink, corresponding to two or more ink which differs in an others and print color or concentration, more than one may be prepared the number of pieces. That is, this invention is very effective not only in the printing mode of only which mainstream color black, for example as a printing mode of ink jet equipment but equipment equipped with at least one of each of the full color printing mode by the double color color of a color or color mixture which is different in whether an ink jet head is constituted in one, or it is based on two or more combination although any are sufficient.

[0048] Furthermore, in addition, in this invention example explained above, although the liquid is explained as a liquid It is the liquid solidified less than [ a room temperature or it ], and what is softened or liquefied at a room temperature may be used. Or by the ink jet method, since what carries out temperature control is common as a temperature control is performed for the liquid itself within the limits of 30 degrees C or more 70 degrees C or less and it is in the stability regurgitation range about the viscosity of a liquid, a liquid may use what makes the shape of liquid at the time of activity print signal grant. In addition, in order to prevent the temperature up by heat energy positively by making it use it as energy of the change of state from a solid condition to the liquid condition of a liquid, or in order to prevent evaporation of a liquid, the liquid which solidifies in the state of neglect and is liquefied with heating may be used. Anyway, a liquid liquefies by grant according to the print signal of heat energy, and this invention can be applied also when using the liquid of the property which will not be liquefied without grant of heat energy, such as that by which a liquefied liquid is breathed out, and a thing which it already begins to solidify when reaching a print medium. The liquid in such a case is good for a porosity sheet crevice or a breakthrough which is indicated by JP,54-56847,A or JP,60-71260,A also as liquefied or a gestalt which counters to an electric thermal-conversion component in the condition of having been held as a solid. In this invention, the most effective thing performs the film-boiling method mentioned above to each liquid mentioned above.

[0049] Furthermore, in addition, as a gestalt of the ink jet equipment concerning this invention using the ink jet head mentioned above, although used as an image printing terminal of information management systems, such as a computer, the gestalt of the reproducing unit combined with others, a reader, etc. and the facsimile apparatus which has a transceiver function further may be taken.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

- [Drawing 1] It is a top view showing the configuration of the first example of the part of the substrate which constitutes the energy generation component unit of the ink jet head by this invention.
- [Drawing 2] It is an II-II view sectional view in drawing 1.
- [Drawing 3] It is a sectional view showing the manufacture procedure of the substrate shown in drawing 2 with drawing 4 and drawing 5.
- [Drawing 4] It is a sectional view showing the manufacture procedure of the substrate shown in drawing 2 with drawing 3 and drawing 5.
- [Drawing 5] It is a sectional view showing the manufacture procedure of the substrate shown in drawing 2 with drawing 3 and drawing 4.
- [Drawing 6] It is a conceptual diagram showing the condition of having combined the energy generation component unit and driver element unit by this invention.
- [Drawing 7] It is a top view showing the configuration of the second example of the part of the substrate which constitutes the energy generation component unit of the ink jet head by this invention.
- [Drawing 8] It is a top view showing the configuration of the third example of the part of the substrate which constitutes the energy generation component unit of the ink jet head by this invention.
- [Drawing 9] It is a perspective view showing the appearance of one example of the ink jet cartridge by this invention.
- [Drawing 10] It is a conceptual diagram showing the appearance of one example of the ink jet equipment by this invention.
- [Drawing 11] It is a perspective view showing the appearance of the energy generation component unit of the ink jet head set as the object of this invention.
- [Drawing 12] It is the perspective view which fractured some energy generation component units shown in drawing 11.
- [Drawing 13] It is a top view showing the electrical circuit of the conventional ink jet head.
- [Drawing 14] Inside of drawing 13 XIV-XIV It is a view sectional view.
- [Drawing 15] It is a perspective view showing the appearance of the conventional driver element unit.
- [Drawing 16] It is a conceptual diagram showing the condition of having combined a conventional energy generation component unit and a conventional driver element unit.
- [Drawing 17] It is a conceptual diagram showing the poor-contact condition of the connection electrode in drawing 16.

**[Description of Notations]**

- 10, 10Y, 10M, 10C, 10B Ink jet head
- 11 Substrate
- 12 Insulating Layer
- 13a, 13b Connection electrode
- 14 Dummy Electrode
- 14a, 14b Dummy electrode



15 Signal Wiring  
15' conductive layer  
16 Exoergic Resistor  
16' resistive layer  
17 Insulating Layer  
18 Cavitation-proof Layer  
19 Through Hole  
20 Connection Electrode  
21 Dummy Electrode  
31 Ink Jet Cartridge  
32 Head Holder  
33 Press Block  
34 Ink Tank  
35 Covering Device Material  
36 Atmospheric-Air Free Passage Opening  
37Y, 37M, 37C, 37B Ink tank  
38 Connecting Piping  
39 Control Unit  
40 Head Driver  
41 Belt for Conveyance  
42 Platen  
43 Head Migration Means  
44 Print Form  
45 Head Cap  
46 Cap Migration Means  
47 Belt Drive Motor  
48 Driving Roller  
49 Motor Driver  
50 Electrification Machine  
51 Electrification Machine Driver  
52 Feed Roller  
53 Motor for Feeding  
54 Motor Driver  
FE, FD Abutting surface  
UE Energy generation component unit  
UD Driver element unit

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[Translation done.]

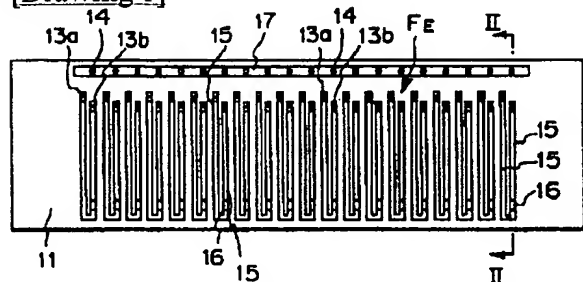
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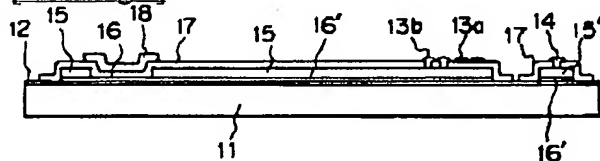
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## DRAWINGS

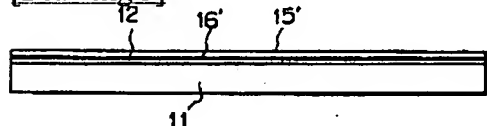
[Drawing 1]



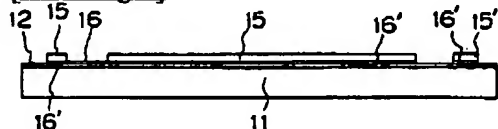
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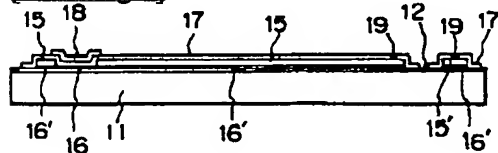
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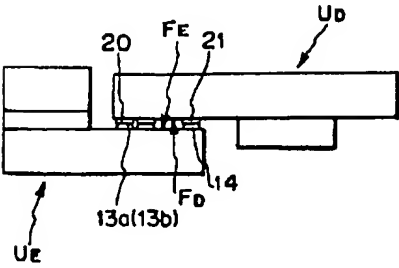
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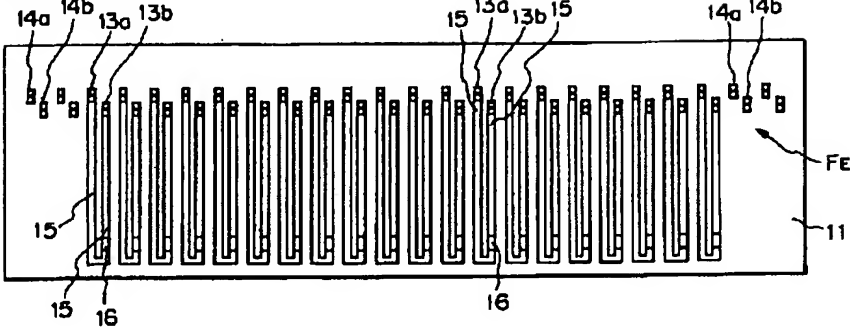
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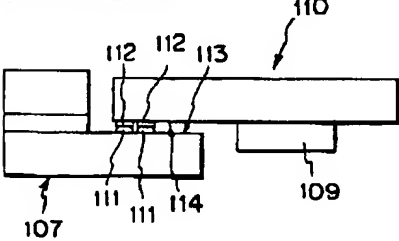
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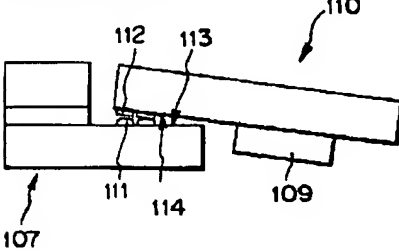
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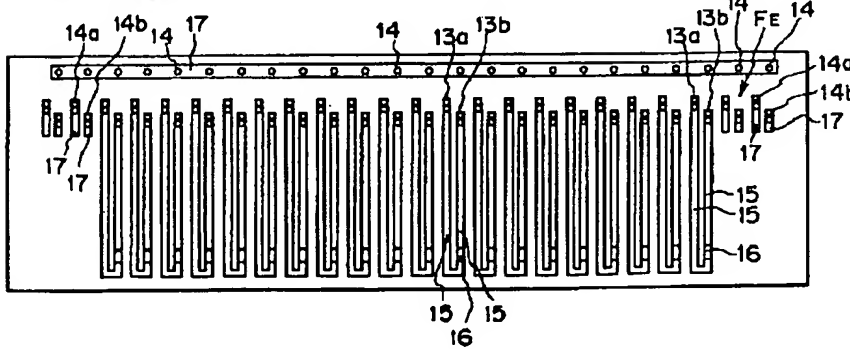
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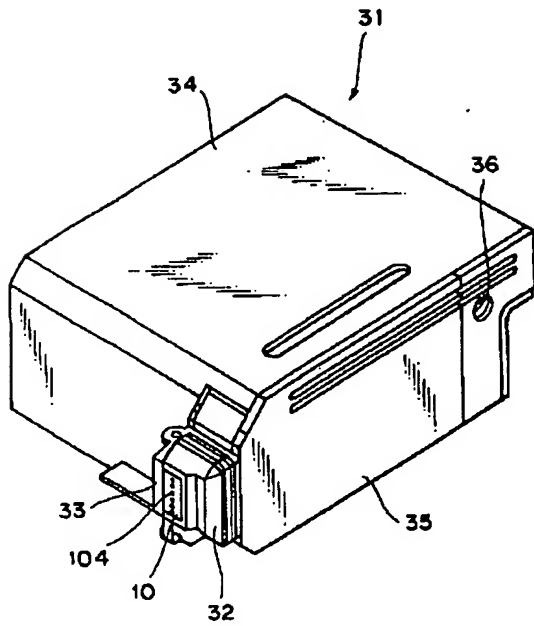
[Drawing 17]



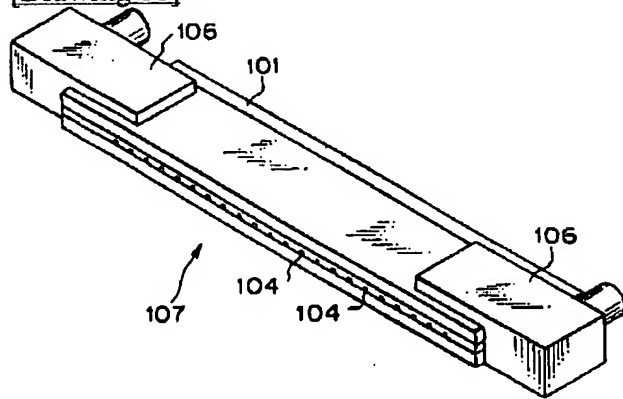
[Drawing 8]



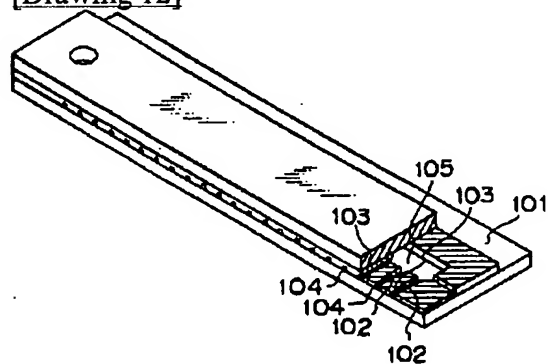
[Drawing 9]



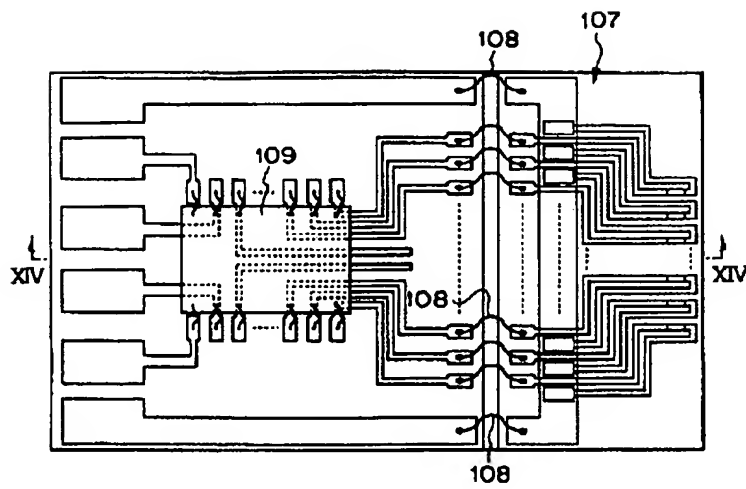
[Drawing 11]



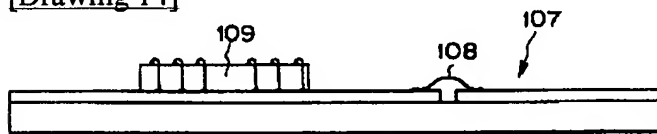
[Drawing 12]



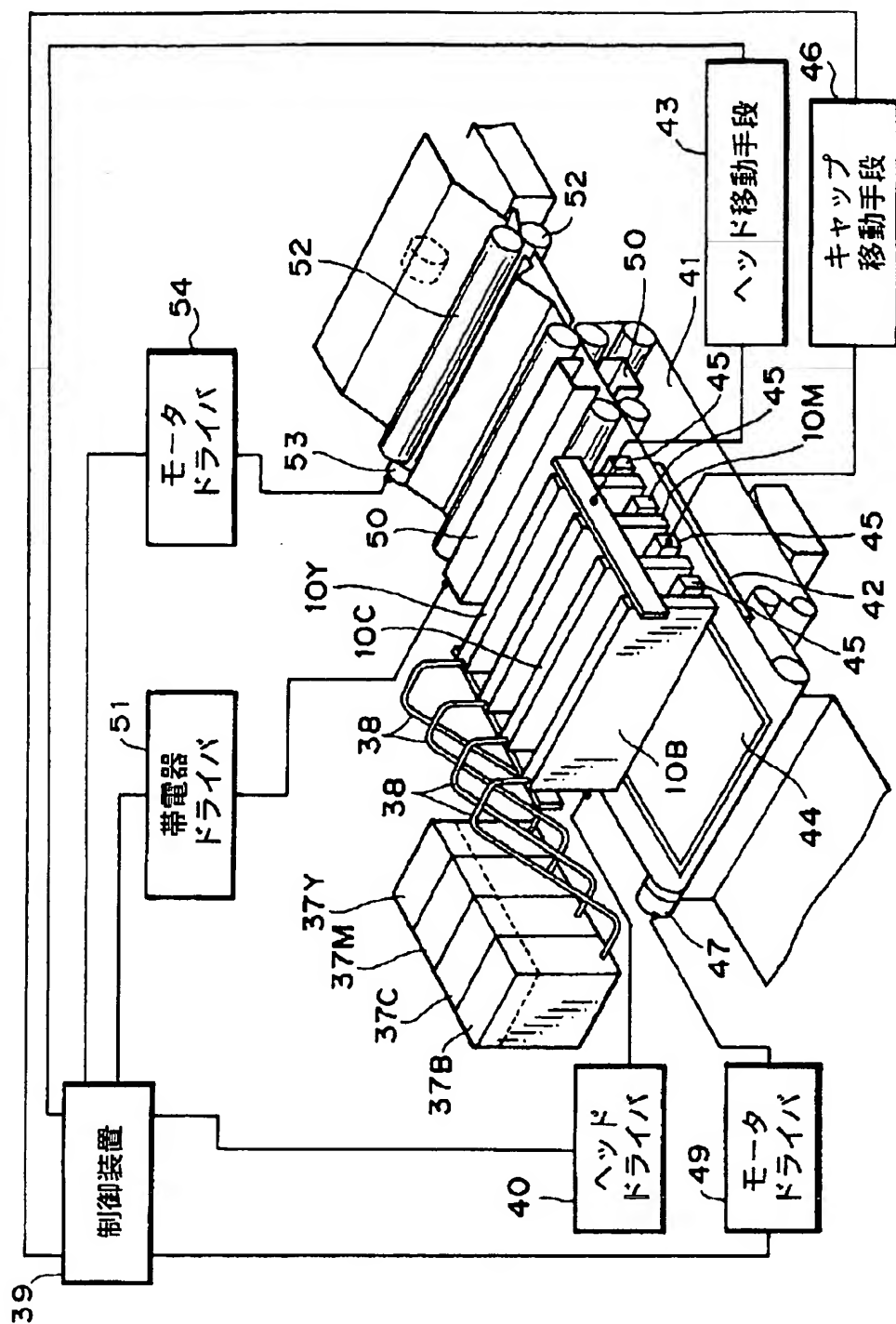
[Drawing 13]



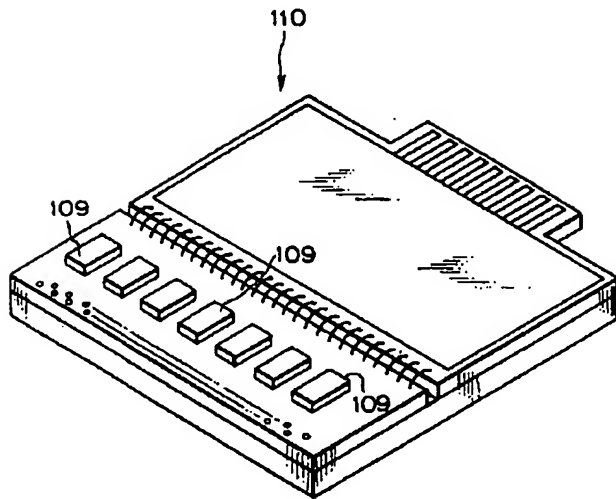
[Drawing 14]



[Drawing 10]



[Drawing 15]



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[Translation done.]

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